HOBART® WELDING PRODUCTS

OM-355 188 290E

August 2001

Processes

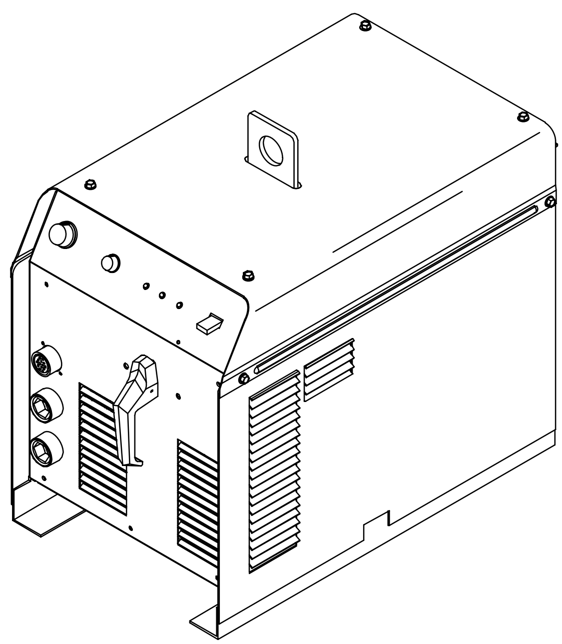
TIG (GTAW) Welding

Stick (SMAW) Welding

Description

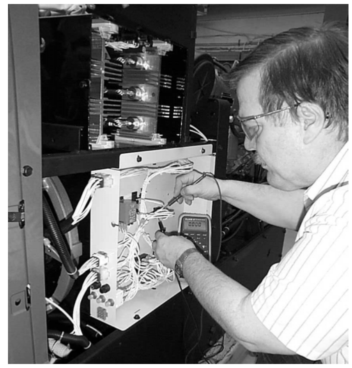
Arc Welding Power Source

Cybertig 180 SD



OWNER'S MANUAL

From Hobart to You

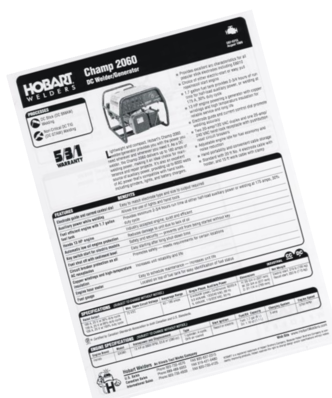


Thank you and *congratulations* on choosing Hobart. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

This Owner's Manual is designed to help you get the most out of your Hobart products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Hobart you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001 REGISTERED QUALITY SYSTEM

Hobart is registered to the ISO 9001 Quality System Standard.



Hobart Welders manufactures a full line of welders and welding related equipment. For information on other quality Hobart products, contact your local Hobart distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-877-Hobart1.**



Hobart offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

HOBART®
WELDING PRODUCTS

⚠ WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means “Note”; not safety related.*



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner’s Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

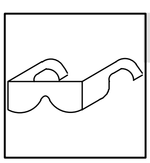
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.



WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



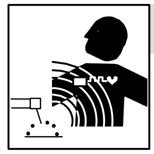
BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



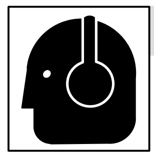
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



MAGNETIC FIELDS can affect pacemakers.

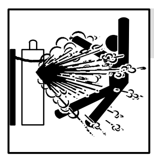
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

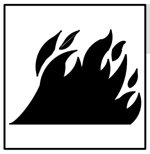


CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Additional Symbols For Installation, Operation, And Maintenance



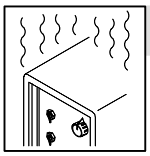
FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



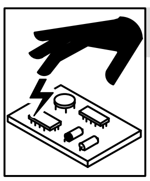
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



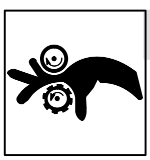
OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



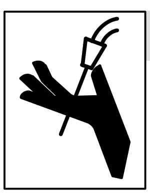
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



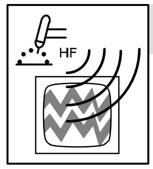
WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



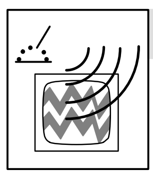
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

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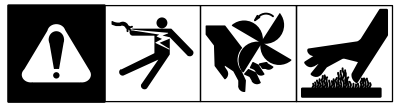
1-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*



Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

1-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-4. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

Il y a DU COURANT CONTINU IMPORTANT dans les convertisseurs après la suppression de l'alimentation électrique.

- Arrêter les convertisseurs, débrancher le courant électrique, et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie entretien avant de toucher les pièces.



LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



LES RAYONS DE L’ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l’arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

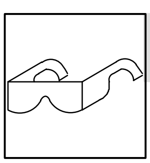
- Porter un casque de soudage muni d’un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l’éclair et de l’éblouissement; demander aux autres personnes de ne pas regarder l’arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.



LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l’arc de soudure. La projection d’étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l’électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s’assurer que l’endroit ne présente pas de danger.

- Se protéger et d’autres personnes de la projection d’étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l’arc de soudage. En cas d’impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d’autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d’incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l’autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu’ils n’aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d’électrocution et d’incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d’électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d’huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu’un allumeur au butane ou des allumettes.



DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l’écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



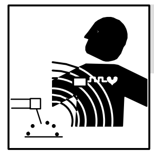
LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l’alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d’un respirateur d’adduction d’air homologué.



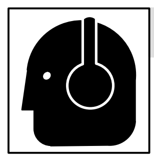
DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues
- Prévoir une période de refroidissement avant d’utiliser le pistolet ou la torche.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

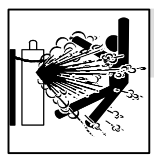
- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d’un stimulateur cardiaque doivent d’abord consulter leur médecin avant de s’approcher des opérations de soudage à l’arc, de gougeage ou de soudage par points.



LE BRUIT peut affecter l’ouïe.

Le bruit des processus et des équipements peut affecter l’ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.



Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d’une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d’explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d’utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.

1-3. Dangers supplémentaires en relation avec l’installation, le fonctionnement et la maintenance



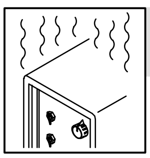
Risque D’INCENDIE OU D’EXPLOSION.

- Ne pas placer l’appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l’appareil à proximité de produits inflammables
- Ne pas surcharger l’installation électrique – s”assurer que l’alimentation est correctement dimensionné et protégé avant de mettre l’appareil en service.



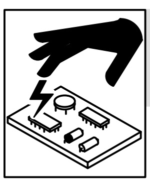
LA CHUTE DE L’APPAREIL peut blesser.

- Utiliser l’anneau de levage uniquement pour soulever l’appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d’une capacité appropriée pour soulever l’appareil.
- En utilisant des fourches de levage pour déplacer l’unité, s’assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l’appareil.



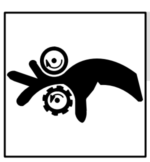
L’EMPLOI EXCESSIF peut SURCHAUFFER L’ÉQUIPEMENT.

- Prévoir une période de refroidissement, respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de recommancer le soudage.
- Ne pas obstruer les passages d’air du poste.



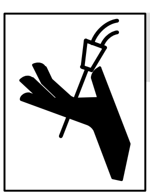
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.



DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas s’approcher des organes mobiles.
- Ne pas s’approcher des points de coincement tels que des rouleaux de commande.



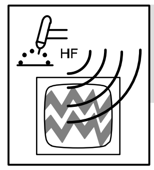
LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gachette avant d’en avoir reçu l’instruction.
- Ne pas diriger le pistolet vers soi, d’autres personnes ou toute pièce mécanique en engageant le fil de soudage.



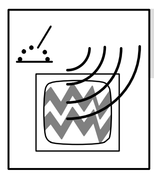
DES ORGANES MOBILES peuvent provoquer des blessures.

- Rester à l’écart des organes mobiles comme le ventilateur.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.



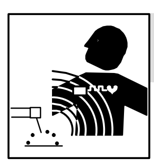
LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute frequence peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l’installation.
- L’utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l’installation.
- Si le FCC signale des interférences, arrêter immédiatement l’appareil.
- Effectuer régulièrement le contrôle et l’entretien de l’installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



LE SOUDAGE À L’ARC risque de provoquer des interférences.

- L’énergie électromagnétique risque de provoquer des interférences pour l’équipement électronique sensible tel que les ordinateurs et l’équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l’équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d’interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d’emploi.
- En cas d’interférences après avoir pris les mesures précédentes, il incombe à l’utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l’utilisation de câbles blindés, l’utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d’un stimulateur cardiaque doivent d’abord consulter leur médecin avant de s’approcher des opérations de soudage à l’arc, de gougeage ou de soudage par points.

1-4. Principales normes de sécurité

Safety in Welding and Cutting, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

Safety and Health Sandards, OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: “L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine”. Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

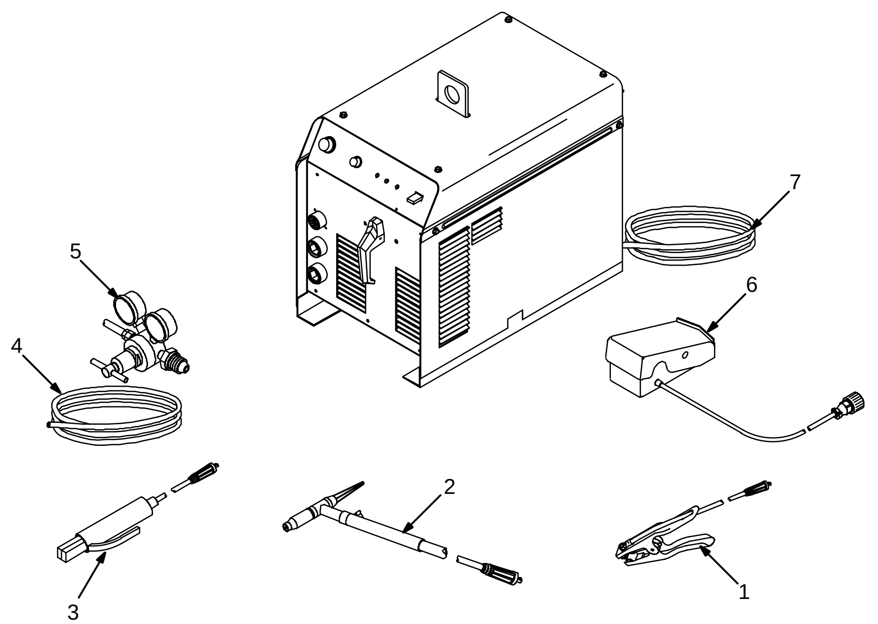
5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci–dessus.

SECTION 2 – INSTALLATION

2-1. Included with Your Unit

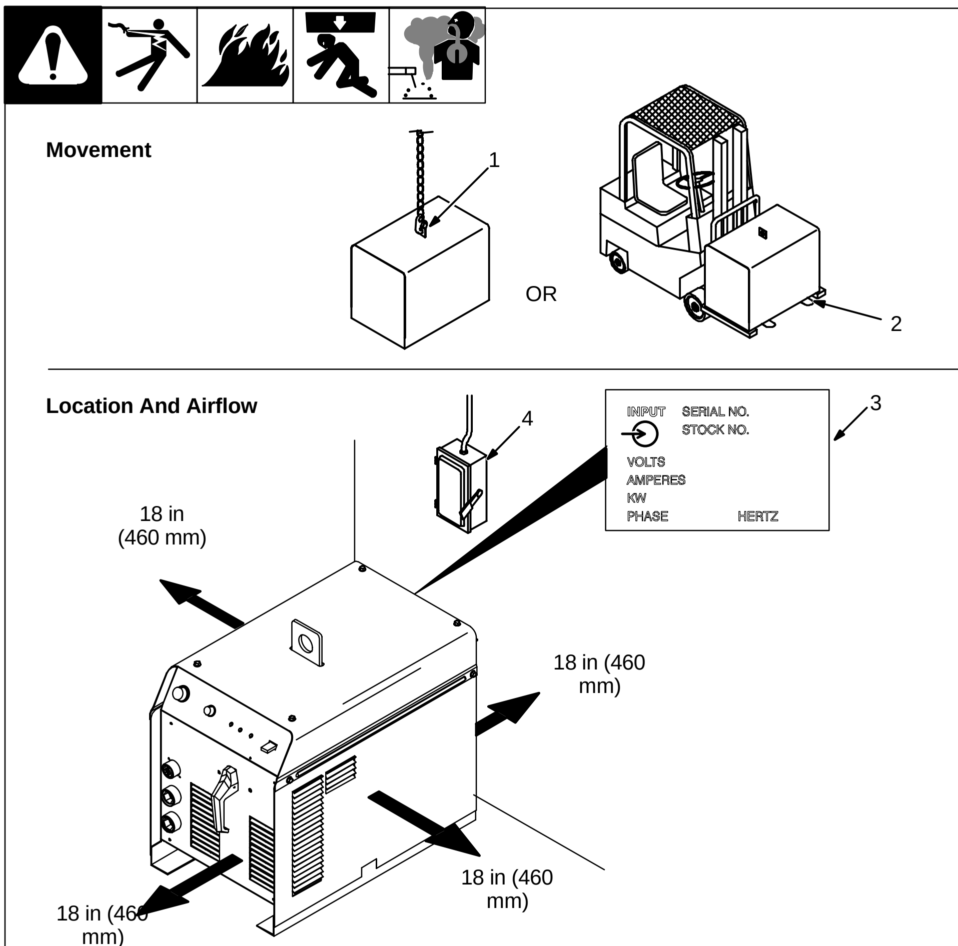


1 12 ft (3.7 m) Work Cable With Clamp And Quick-Connect
2 150 Amp TIG Torch with 12-1/2 ft (3.8 m) Cable
3 Electrode Holder and Quick-Connect
4 Gas Hose
5 Gas Regulator
6 RFCS-14 Foot Control with 20 ft (6 m) Cable
7 8 ft (2.4 m) Primary Cord

☞ *Some assembly is required.*

For options and accessories see back of book or contact your distributor.

2-2. Selecting A Location



1 Lifting Eye
2 Lifting Forks

Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

3 Rating Label

Use rating label to determine input power needs.

4 Line Disconnect Device

Locate unit near correct input power supply.

Position unit so air can circulate.

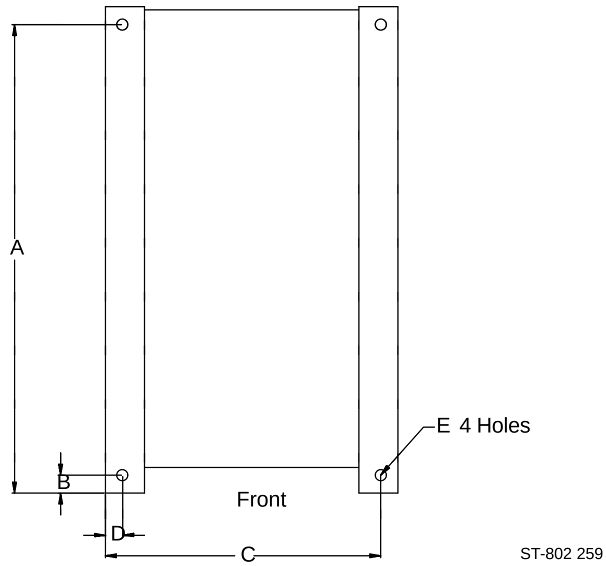
For information about sources of high-frequency see Section 6.

For carts and caster kits see back of book or contact your distributor.

▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

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2-3. Dimensions And Weights



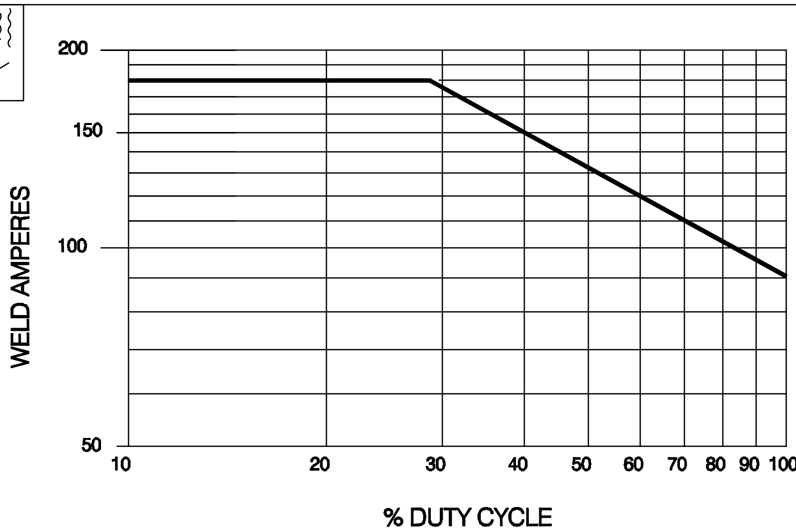
Dimensions	
Height	21 in (533 mm)
Width	13-5/8 in (346 mm)
Length	22-1/8 in (562 mm)
A	21-5/16 in (541 mm)
B	13/16 in (21 mm)
C	12-7/16 in (316 mm)
D	1–1/16 in (27 mm)
E	1/2 (13 mm)
Weight	
210 lbs (95 kg)	

2-4. Specifications

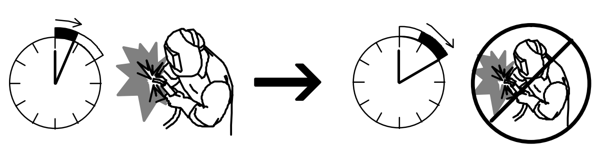
Mode	Rated Output at 40% Duty Cycle	Rated Input, 60 HZ, Single-Phase	KVA	KW	Welding Amperage Range	Max. Open-Circuit Voltage
DC TIG	150 Amps at 16 Volts	230 V–38 A - (2)*	8.7 - (0.50)*	4.0 - (0.3)*	10–180	80
DC Stick	150 Amps at 26 Volts	230 V–42 A - (2)*	9.7 - (0.50)*	5.7 - (0.3)*	10–180	80
AC TIG	150 Amps at 16 Volts	230 V–67 A - (2)*	15.5 - (0.50)*	4.9 - (0.3)*	15–180	80
AC Stick	150 Amps at 26 Volts	230 V–53 A - (2)*	12.2 - (0.50)*	6.2 - (0.3)*	15–180	80
* () While idling.						

2-5. Duty Cycle Chart





40% Duty Cycle at 150 A AC/DC



4 Minutes Welding

6 Minutes Resting

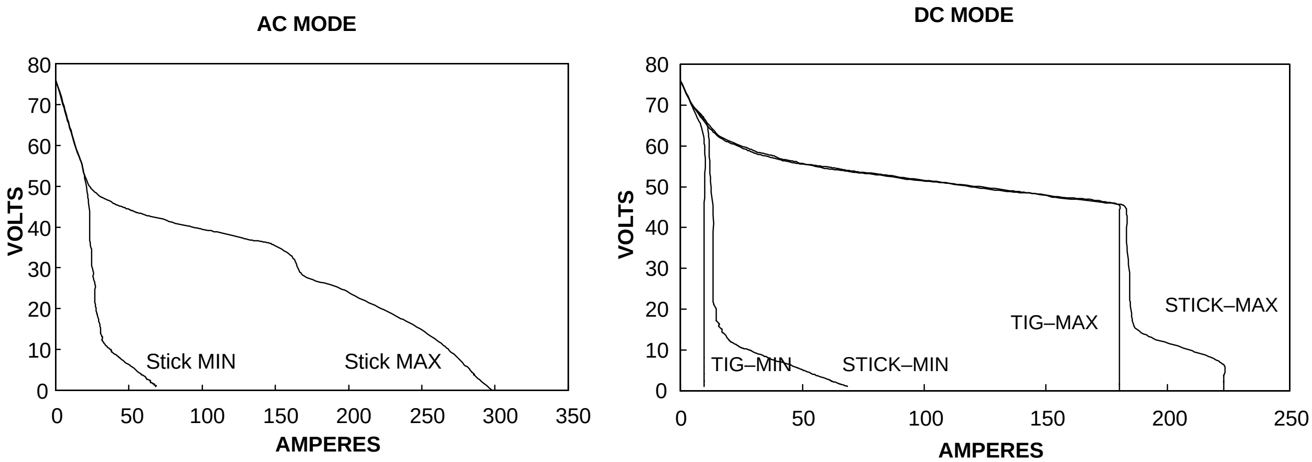
Duty cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

▲ **Exceeding duty cycle can damage unit and void warranty.**

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2-6. Volt-Ampere Curves

Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.



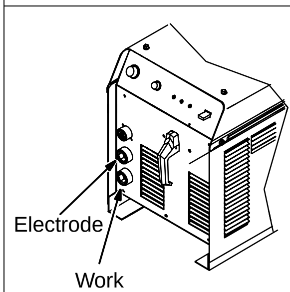
ssb1.1 10/91 – ST-188 277 / ST-188 278

2-7. Weld Output Terminals And Selecting Cable Sizes



▲ **ARC WELDING can cause Electromagnetic Interference.**

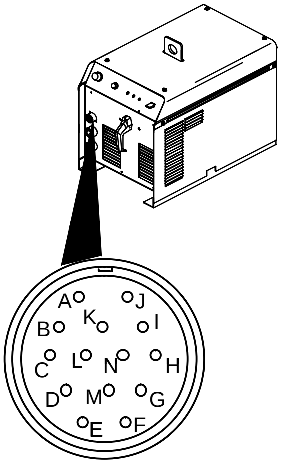
To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor. Locate welding operation 100 meters from any sensitive electronic equipment. Be sure this welding machine is installed and grounded according to this manual. If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

 Weld Output Terminals	Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding							
		100 ft (30 m) Or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
		10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
 Ref. ST-802 238	100	4	4	4	3	2	1	1/0	1/0
	150	3	3	2	1	1/0	2/0	3/0	3/0
	200	3	2	1	1/0	2/0	3/0	4/0	4/0
	250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0

Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere. S-0007-D

2-8. Remote 14 Receptacle

NOTE	*Remote control device has complete control of amperage at all times when connected to Remote 14 receptacle.*



ST-802 238

	Socket*	Socket Information
	A	24 volts DC.
	B	Contact closure to A completes 24 volts DC contactor control circuit.
A	C	Command reference; 0 to +10 volts DC output to remote control.
	D	Remote control circuit common.
	E	0 to +10 volts DC input command signal from remote control.
	K	Chassis common.

*The remaining sockets are not used.

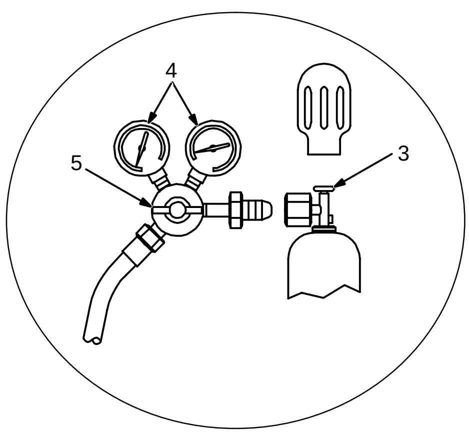
2-9. Shielding Gas Connections

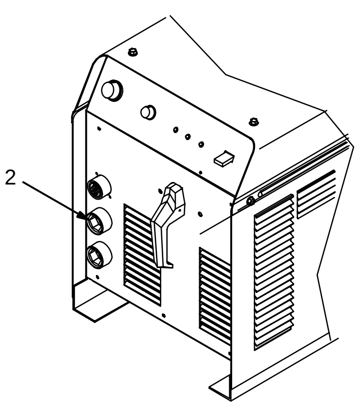


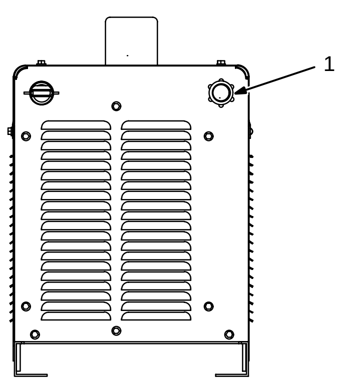
Tools Needed:



5/8, 1-1/8 in







▲ **Turn Off power before connecting to receptacle.**

1 Gas Valve In Fitting

Fitting has 5/8-18 right-hand threads.

Located on rear of unit.

2 Gas Valve Out Fitting

Gas connection is integrated into the Electrode weld output terminal by means of a flow-through type connector.

3 Cylinder Valve

Open valve slightly so gas flow blows dirt from valve. Close valve.

4 Regulator/Flow Gauge

Connect regulator/flow gauge to gas cylinder.

Connect gas hose to gas in fitting.

5 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour).

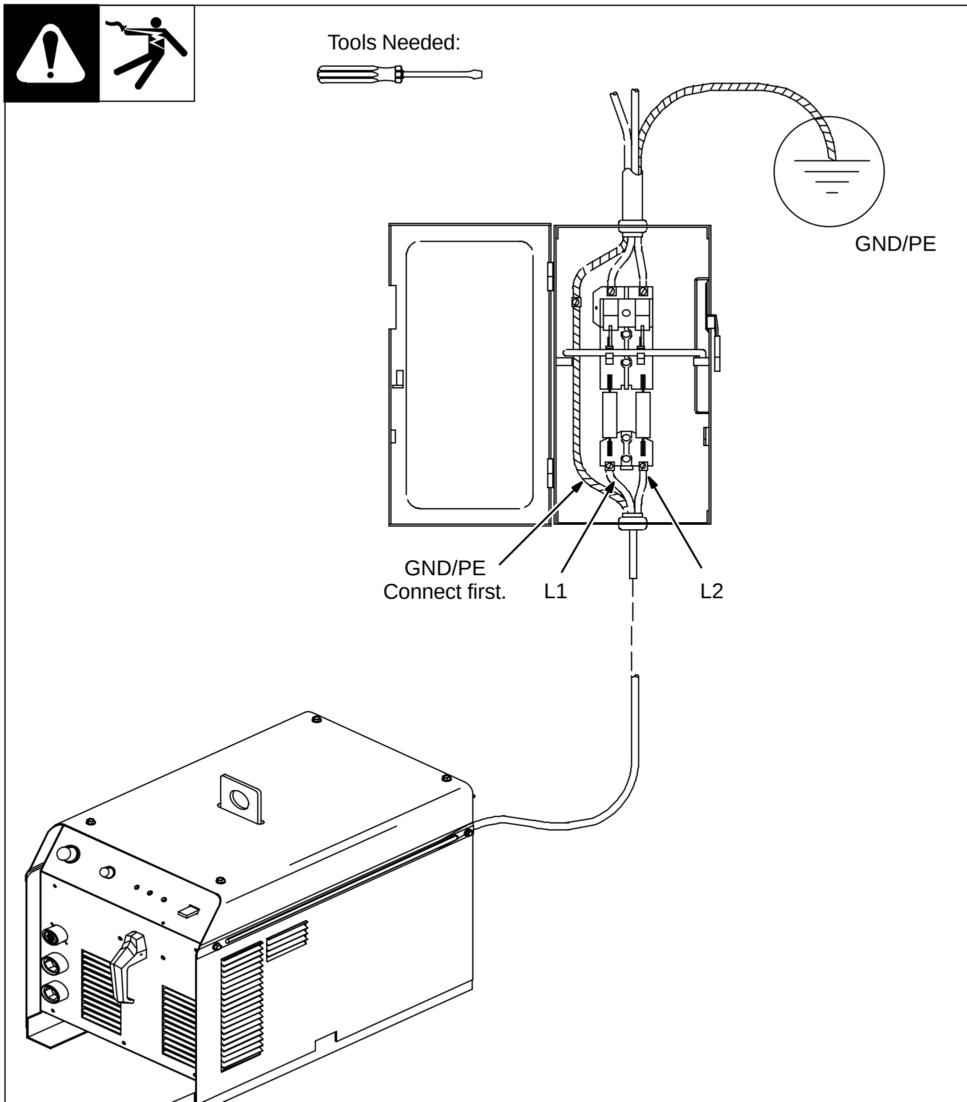
Ref. ST-802 238 / Ref. ST-802 258 / Ref. ST-157 858

2-10. Electrical Service Guide

NOTE	*All values calculated at 40% duty cycle.*

Input Voltage	230
Input Amperes at Rated Output	67
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	100
Min Input Conductor Size In AWG/Kcmil	8
Max Recommended Input Conductor Length In Feet (Meters)	166 (51)
Min Grounding Conductor Size In AWG/Kcmil	8
Reference: 1996 National Electrical Code (NEC)	S-0092-J

2-11. Connecting Input Power



▲ **Have only qualified persons make this installation.**

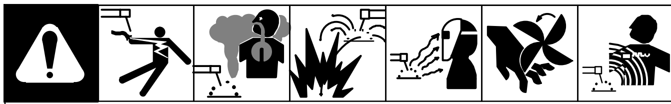
▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

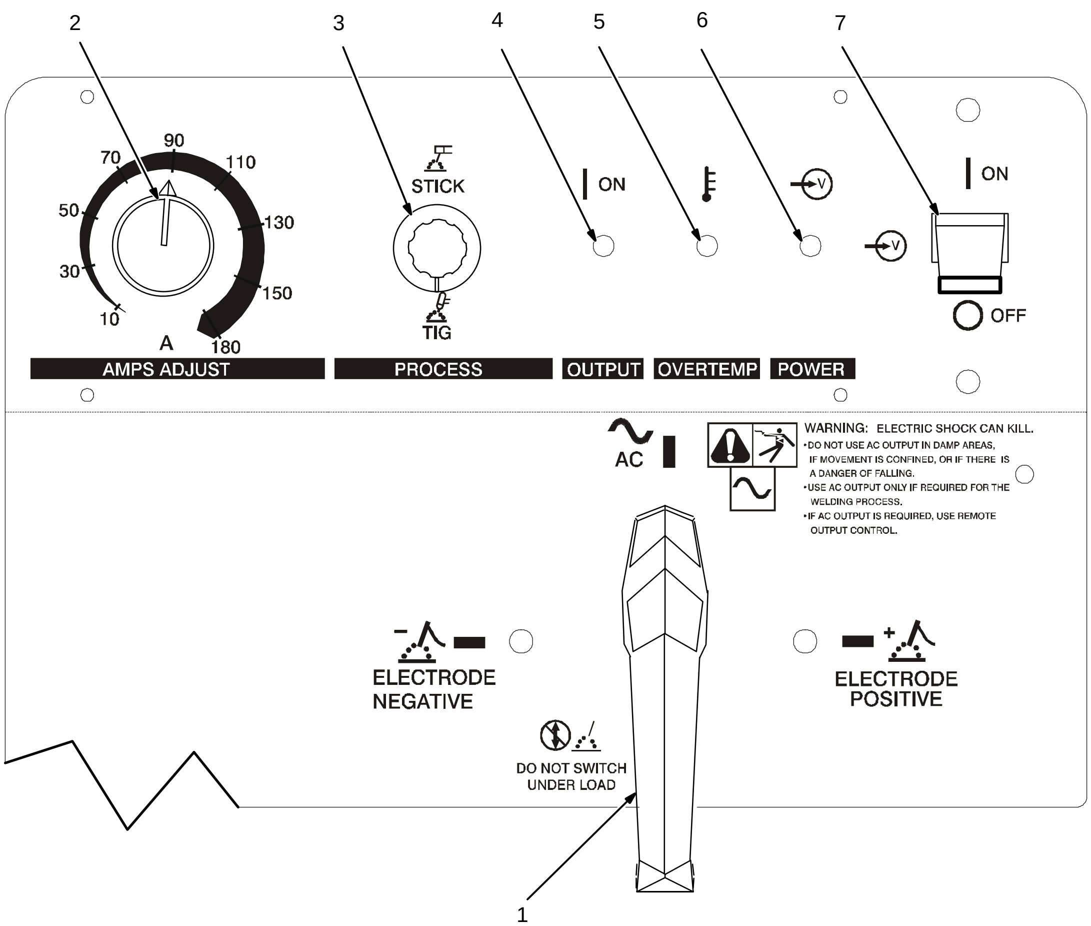
Units come equipped with input power cord for installation into line disconnect device. Select type and size overcurrent protection using Section 2-10.

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SECTION 3 – OPERATION

3-1. Controls





Ref. ST-188 714-A

1 Output Selector Switch

▲ **Do not use AC output in damp areas, if movement is confined, or if there is danger of falling. Use AC output ONLY if required for the welding process, and then use a remote control.**

▲ **Do not change position of switch while welding or while under load.**

Use switch to select Direct Current Electrode Negative (DCEN), AC, or Direct Current Electrode Positive (DCEP) output without changing weld output cable connections.

2 Amperage Adjust Control

For Stick (SMAW), use control to adjust amperage.

For remote amperage control used when TIG (GTAW) welding, front panel Amperage control setting is the maximum amperage available at the remote control device.

See Section 3-3 for example of remote amperage control.

3 Weld Process Switch

Use switch to select weld process.

In Stick position (up), weld output goes On and Off with Power switch.

In GTAW (TIG) position (down), remote control device turns on and adjusts weld output of unit as limited by Amperage control. For Direct Current Electrode Negative (DCEN), built-in arc starter comes on when needed to start or stabilize welding arc. For AC welding, the arc starter will turn on and stay on to start and stabilize the welding arc. No adjustments needed for arc starter.

4 Output (Contactor) Light

Lights when output (contactor) and unit power are on.

5 Overtemp Light

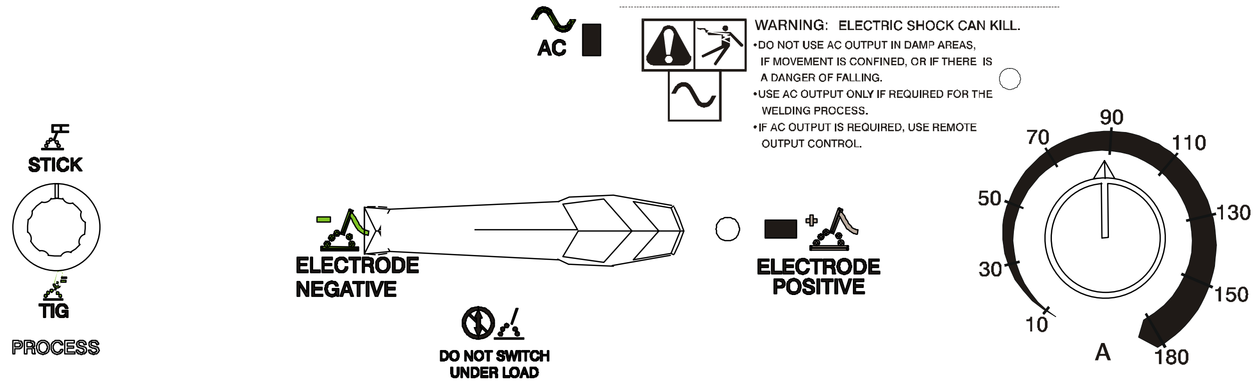
Lights when unit overheats and shuts down (see Section 4-3).

6 Pilot Light

7 Power Switch

Use switch to turn unit, fan, and pilot light On and Off.

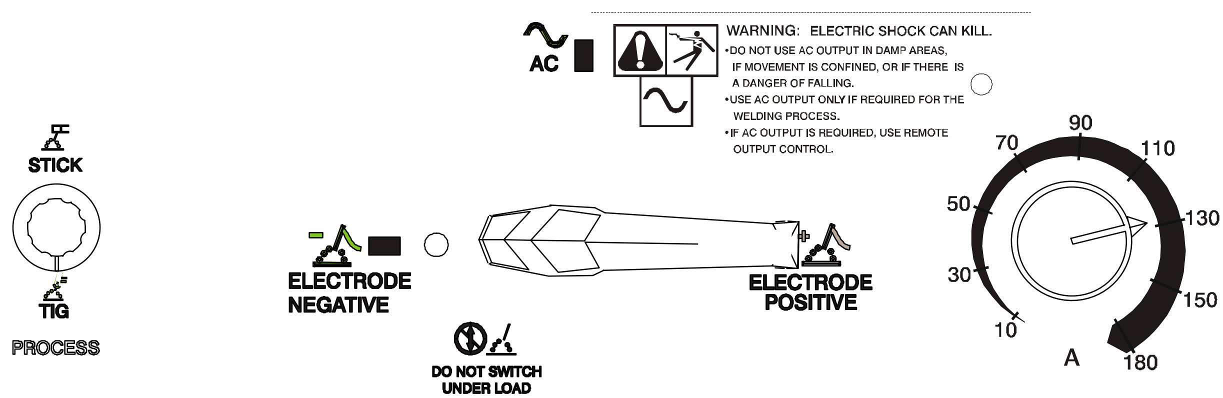
3-2. Example of Front Panel Amperage Control For Stick (SMAW) Welding



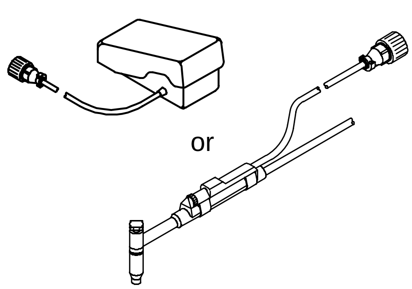
Select weld process. → Select polarity. → Select amperage.

In Example:
Remote weld amperage = 10–180 amps DC
NOTE: Remote amperage control is active whenever a remote control is connected. If the remote device does not include a means of controlling amperage through pin E, the Amperage Adjustment control on the front panel remains active.

3-3. Example of Remote Amperage Control For TIG (GTAW) Welding



Select weld process. → Select polarity. → Select max amperage →

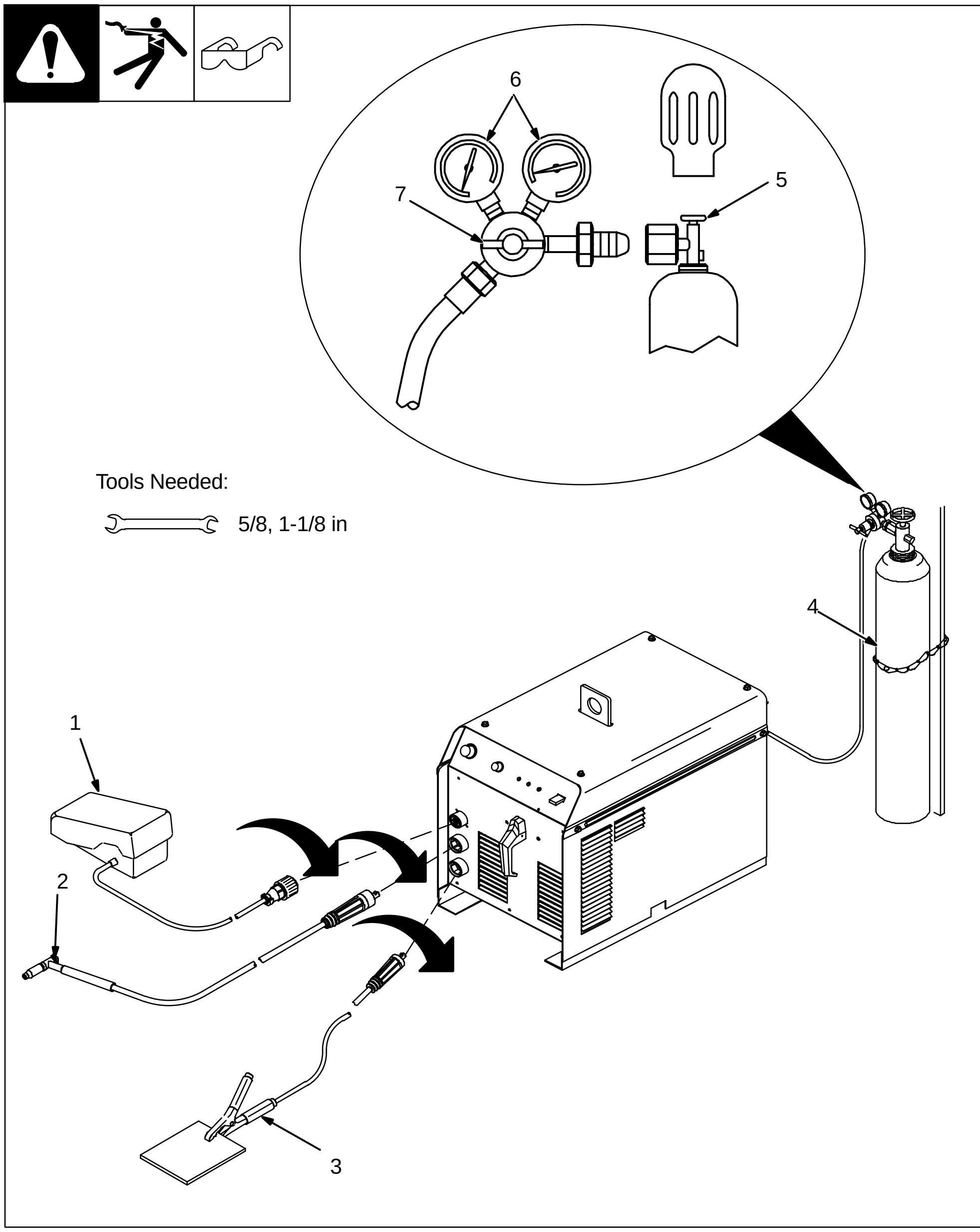


→

Connect remote control (see Section 3-4).

In Example:
For remote amperage control, front panel amperage control setting is the maximum amperage available. Full range is 10–180 amps DC, but if front panel amperage control is set at 130 amps, the range of remote amperage control is 10 to 130 amps DC. **NOTE: Remote amperage control is active whenever a remote control is connected.** If the remote device does not include a means of controlling amperage through pin E, the Amperage Adjustment control on the front panel remains active.

3-4. Typical TIG Connections



1 Remote Foot Control

A customer supplied remote finger-tip control may also be used.

2 Torch

3 Work Clamp

Connect remote control, torch, and work clamp to receptacles as shown.

4 Cylinder

Chain or secure cylinder to running gear, wall, or other stationary support.

5 Cylinder Valve

Open valve slightly so gas flow blows dirt from valve. Close valve.

6 Regulator/Flow Gauge

Install so face is vertical.

7 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour) (9.4 L/min).

NOTE: After activating remote control, 0.3 seconds of gas preflow will begin.

Application:

Preflow is used to purge the immediate weld area of atmosphere. Preflow also aids in consistent arc starting.

NOTE: When remote control is released, gas continues to flow for 18 seconds

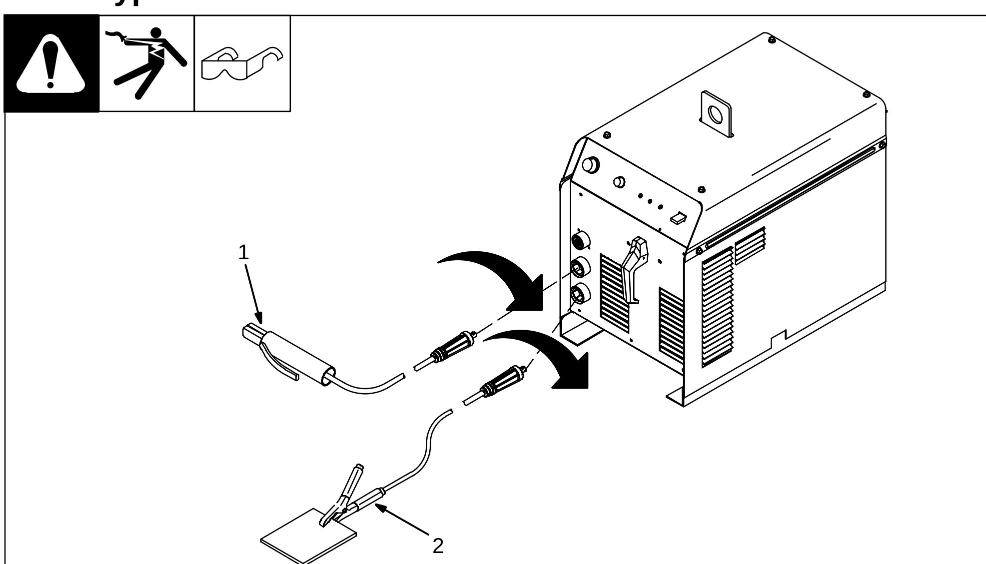
Application:

Postflow is required to cool tungsten and weld, and to prevent contamination of tungsten and weld. Increase postflow time if tungsten or weld are dark in appearance. NOTE: Both preflow and postflow are preset and are not adjustable.

NOTE: When AC welding, the balance control is preset at 60% electrode negative (EN), and 40% electrode positive (EP).

ST-802 238

3-5. Typical Stick Connections



1 Electrode Holder

2 Work Clamp

Connect electrode holder and work clamp to receptacles as shown.

ST-802 238

3-6. Process and Material Thickness Guide Label

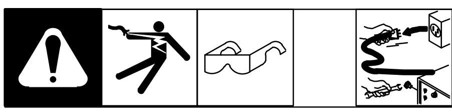
Guideline For Welding Process And Output For Material

Material And Weld Output	22 ga 0.033 in 0.8 mm	20 ga 0.036 in 0.9 mm	18 ga 0.048 in 1.2 mm	16 ga 0.06 in 1.5 mm	14 ga 0.07 in 1.8 mm	12 ga 0.1 in 2.5 mm	11 ga 0.125 in 3.2 mm	10 ga 0.14 in 3.6 mm	6 ga 0.186 in 4.8 mm	2 ga 0.25 in 6.3 mm	– 0.25+ in 6.3+ mm
Steel Or Stainless Steel (–) DCEN ELECTRODE NEGATIVE	GTAW Difficult		GTAW Recommended							SMAW With DCEP Output	
Aluminum AC	GTAW Difficult				GTAW Recommended					GTAW Not Recommended	

S-167 338

SECTION 4 – MAINTENANCE AND TROUBLESHOOTING

4-1. Routine Maintenance

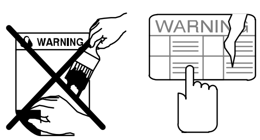


▲ **Disconnect power before maintaining.**

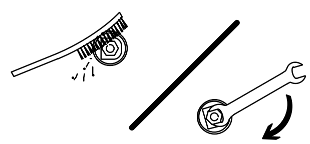
☞ *Maintain more often during severe conditions.*

3 Months

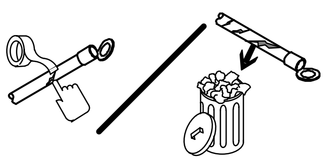
Replace unreadable labels.



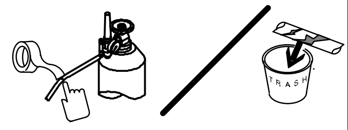
Clean and tighten weld terminals.



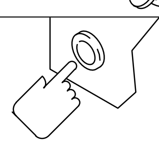
Repair or replace cracked weld cable.



Repair or replace cracked gas hose.

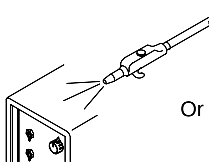


Replace o-ring in Electrode/Gas Output receptacle if cracked.

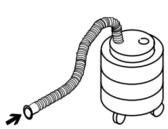


6 Months

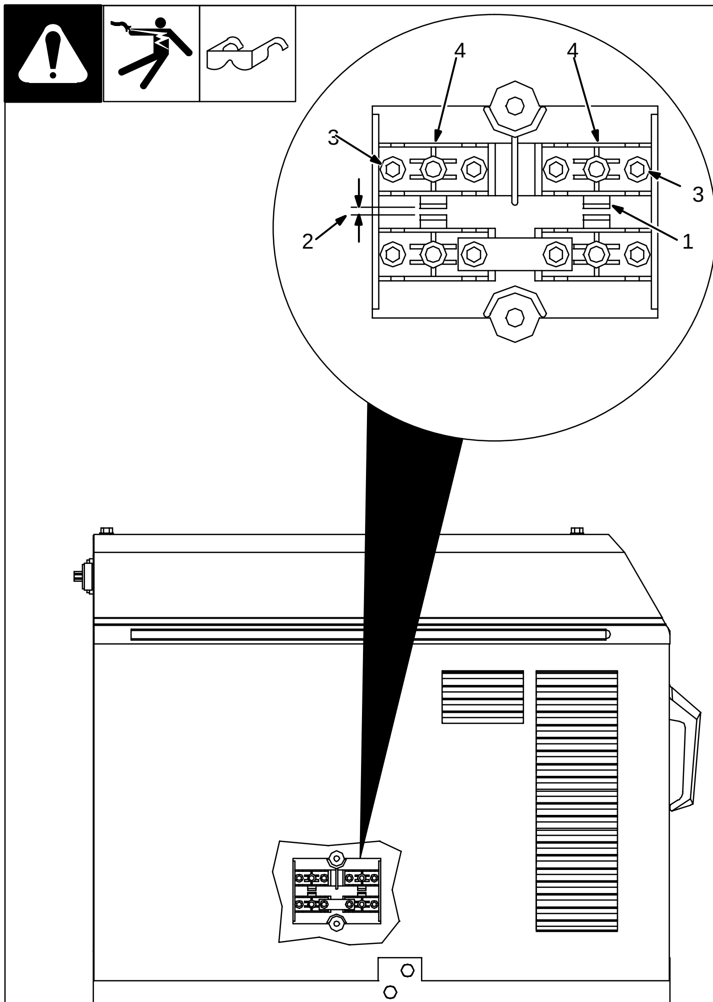
Blow out or vacuum inside.



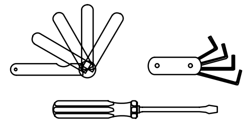
Or



4-2. Adjusting Spark Gaps



Tools Needed:



▲ **Turn Off power before adjusting spark gaps.**

Remove left side panel.

1 Tungsten End Of Point

Replace point if tungsten end disappears; do not clean or dress tungsten.

2 Spark Gap

Normal spark gap is 0.012 in (0.305 mm).

If adjustment is needed, proceed as follows:

3 Adjustment Screws

Loosen screws. Place gauge of proper thickness in spark gap.

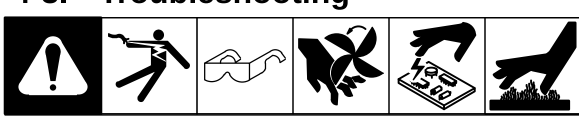
4 Pressure Point

Apply slight pressure at point until gauge is held firmly in gap. Tighten screws to 12 in/lbs torque (overtightening will deform plastic base). Adjust other gap.

Reinstall left side panel.

ST-802 745

4-3. Troubleshooting



Trouble	Remedy
No weld output; fan does not run.	Place line disconnect switch in On position (see Section 2-11).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 2-11).
	Check for proper input power connections (see Section 2-11).
No weld output; fan on.	Be sure Polarity switch is not set between positions.
	Tighten remote control connection to Remote 14 receptacle.
	Check remote control (see remote control Owner’s Manual).
	Unit overheated. Allow unit to cool (see Section 2-5).
Fan not operating; weld output available.	Check for and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor.

SECTION 5 – ELECTRICAL DIAGRAM

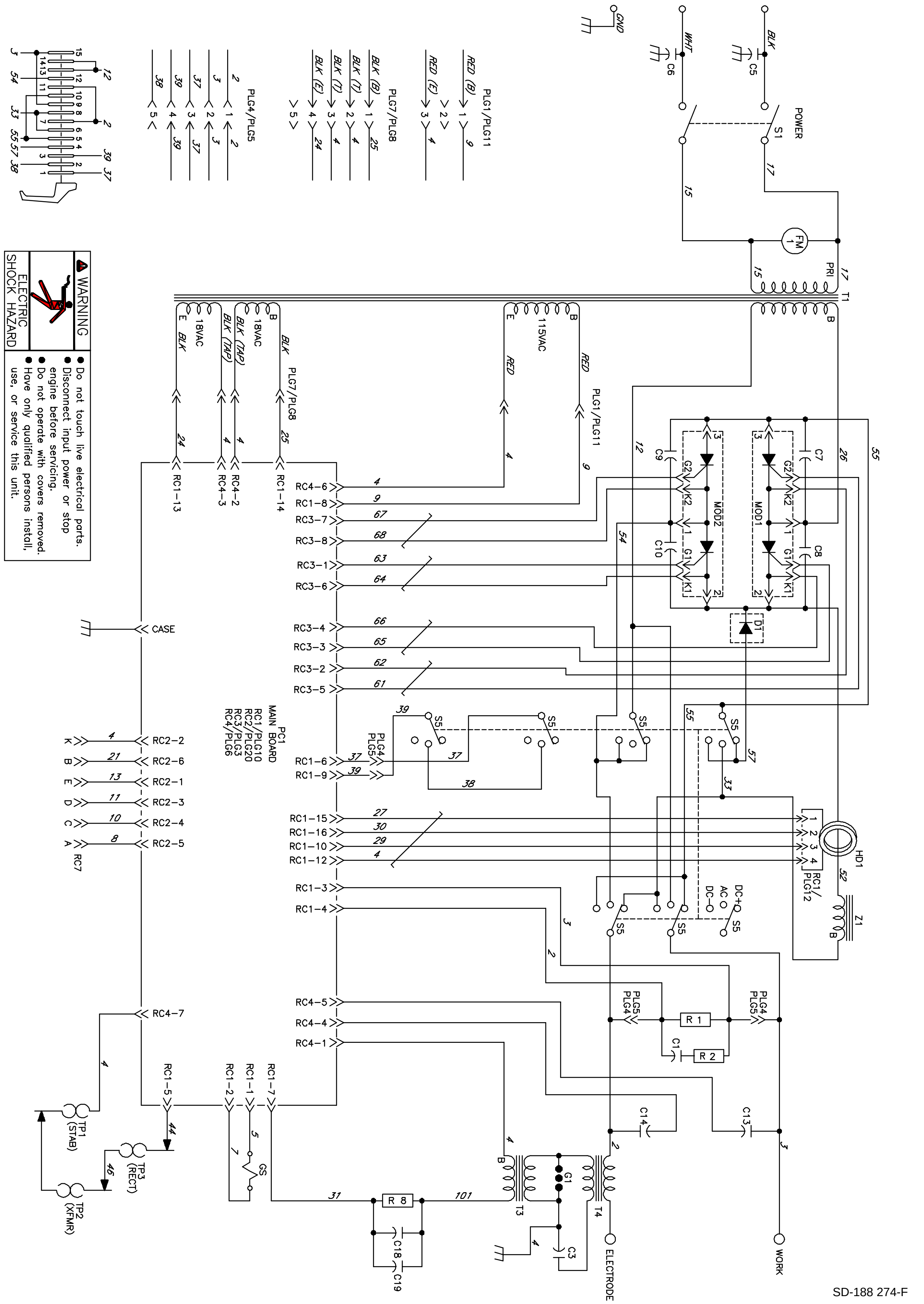
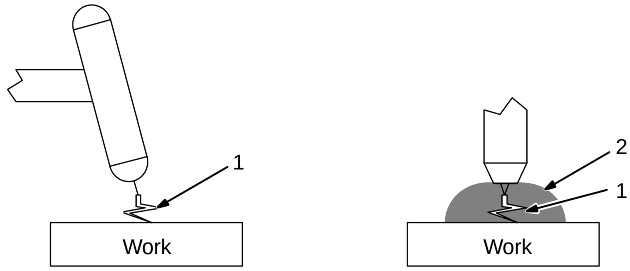


Figure 5-1. Circuit Diagram For Welding Power Source

SECTION 6 – HIGH FREQUENCY (HF)

6-1. Welding Processes Using HF



Gas Tungsten Arc Welding (GTAW)

Submerged Arc Welding (SAW)

1 HF Voltage

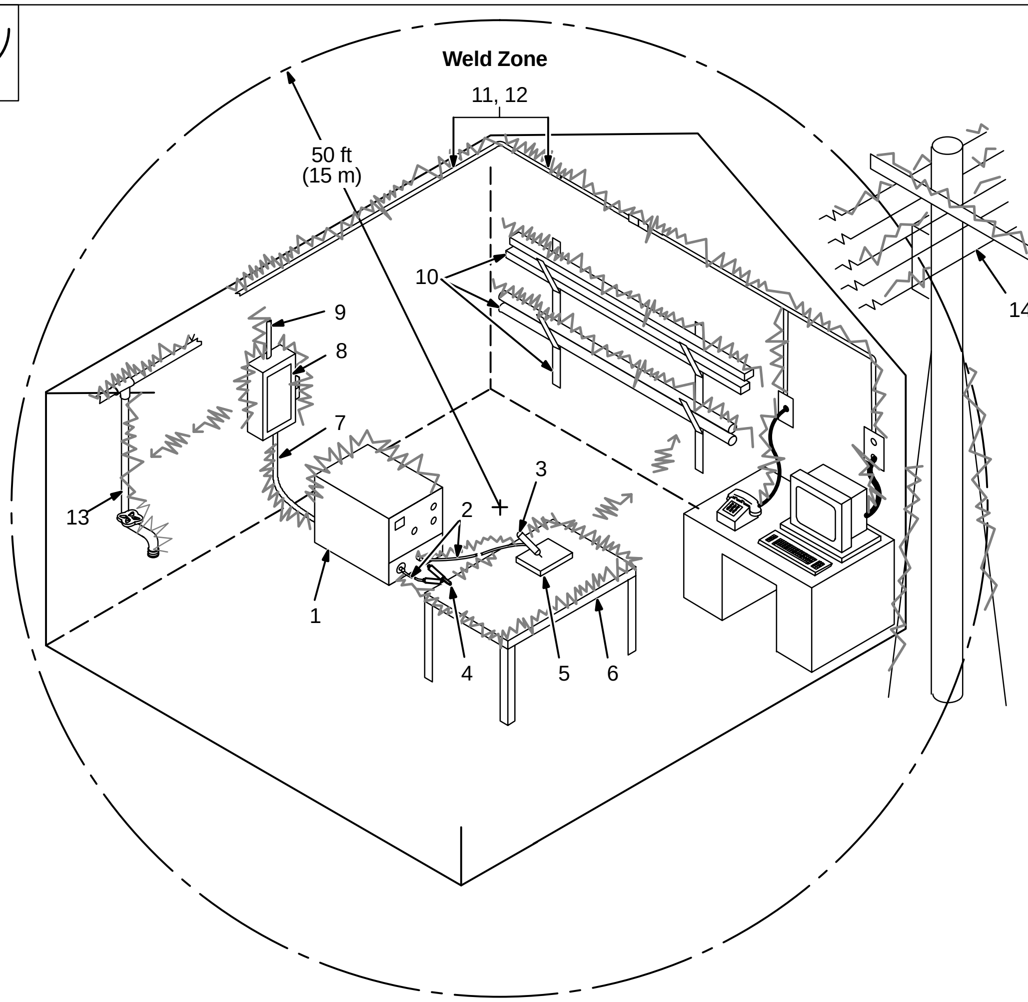
GTAW – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

SAW – helps arc reach workpiece through flux granules.

2 Flux

high_freq1 7/95 – S-0693

6-2. Sources Of HF Radiation From Incorrect Installation



S-0694

Sources Of Direct HF Radiation

1 HF source (welding power source with built-in HF or separate HF unit)

2 Weld Cables

3 Torch

4 Work Clamp

5 Workpiece

6 Work Table

Sources Of Conduction Of HF

7 Input Power Cable

8 Line Disconnect Device

9 Input Supply Wiring

Sources Of Reradiation Of HF

10 Ungrounded Metal Objects

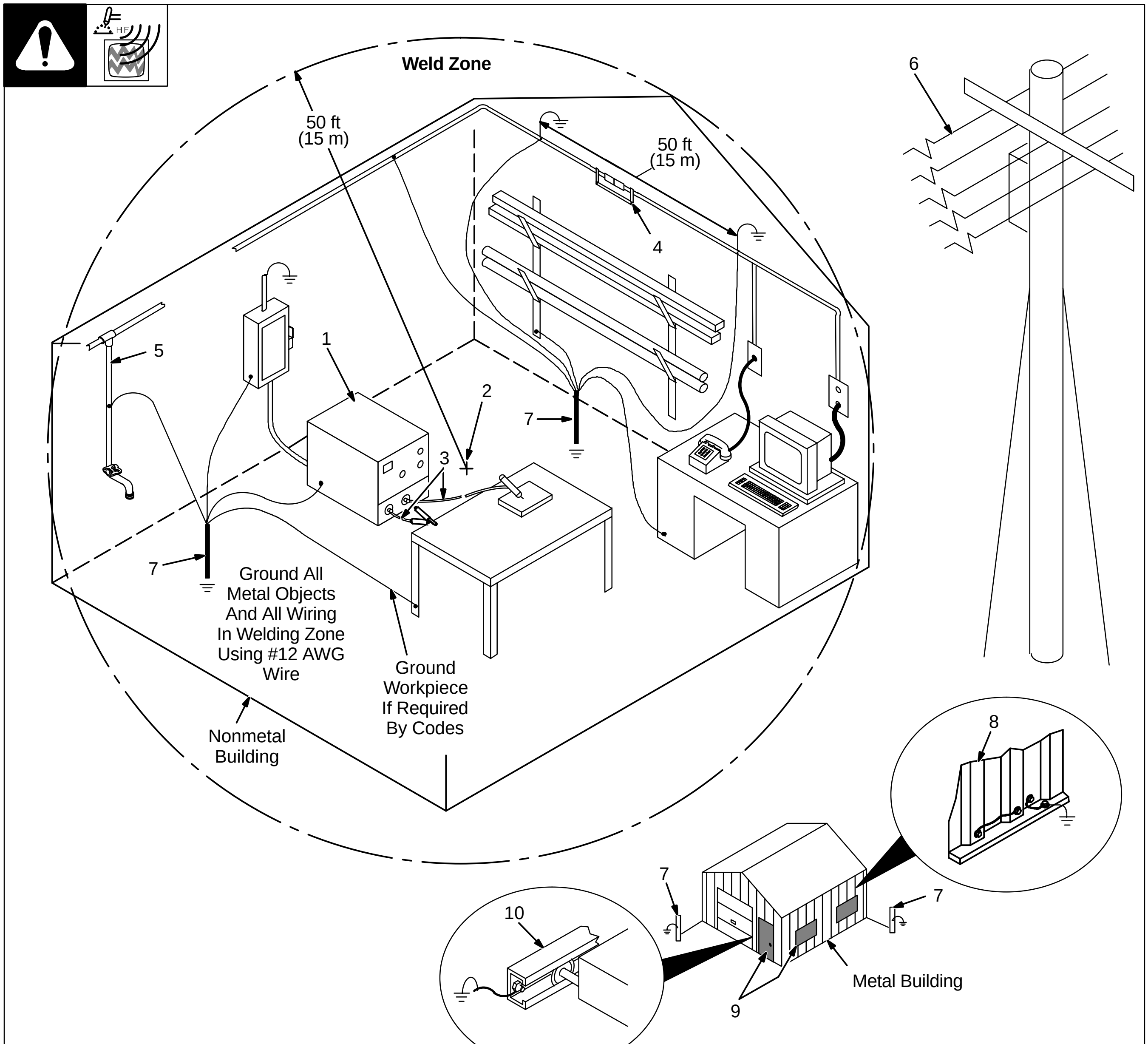
11 Lighting

12 Wiring

13 Water Pipes And Fixtures

14 External Phone And Power Lines

6-3. Correct Installation



Ref. S-0695 / Ref. S-0695

1 HF Source (Welder With Built-In HF Or Separate HF Unit)

Ground metal machine case, work output terminal, line disconnect device, input supply, and worktable.

2 Welding Zone And Centerpoint

A circle 50 ft (15 m) from centerpoint between HF source and welding torch in all directions.

3 Weld Output Cables

Keep cables short and close together.

4 Conduit Joint Bonding And Grounding

Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).

5 Water Pipes And Fixtures

Ground water pipes every 50 ft (15 m).

6 External Power Or Telephone Lines

Locate HF source at least 50 ft (15 m) away from power and phone lines.

7 Grounding Rod

Consult the National Electrical Code for specifications.

8 Metal Building Panel Bonding Methods

Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.

9 Windows And Doorways

Cover all windows and doorways with grounded copper screen of not more than 1/4 in (6.4 mm) mesh.

10 Overhead Door Track

Ground the track.

SECTION 7 – SELECTING AND PREPARING TUNGSTEN ELECTRODE

gtaw2 7/97

NOTE	*For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process. Wear clean gloves to prevent contamination of tungsten electrode.*

7-1. Selecting Tungsten Electrode

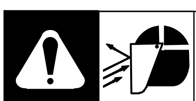
Electrode Diameter	**Amperage Range - Gas Type♦ - Polarity**	
	DC – Argon – Electrode Negative/Straight Polarity	**DC – Argon – Electrode Positive/Reverse Polarity**
2% Thorium Alloyed Tungsten (Red Band)		
.010”	Up to 25	*
.020”	15-40	*
.040”	25-85	*
1/16”	50-160	10-20
3/32”	135-235	15-30
1/8”	250-400	25-40
5/32”	400-500	40-55
3/16”	500-750	55-80
1/4”	750-1000	80-125

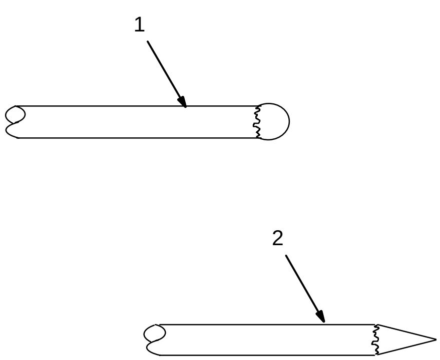
♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour) – 7 to 16.5 lpm (liters per minute).

*Not Recommended.

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

7-2. Safety Information About Tungsten





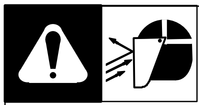
▲ **Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using tungsten containing ceria, lanthana, or yttria instead of thoria. Grinding dust from thoriated electrodes contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.**

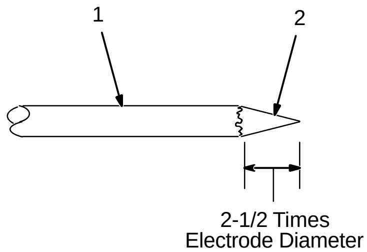
1 Tungsten Electrode With Balled End

2 Pointed Tungsten Electrode

Ref. S-0161

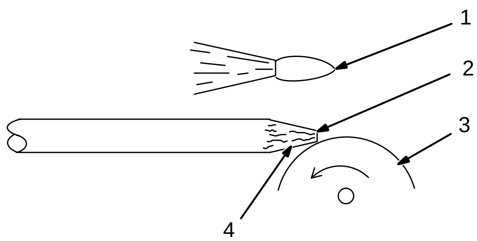
7-3. Preparing Tungsten For DC Electrode Negative (DCEN) Welding





1 Tungsten Electrode
2 Tapered End

Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.

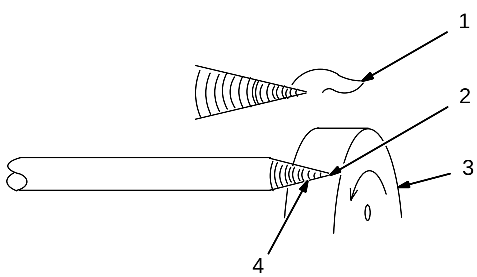


Ideal Tungsten Preparation – Stable Arc

1 Stable Arc
2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel
4 Straight Ground



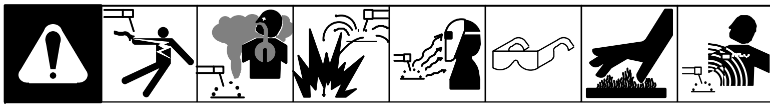
Wrong Tungsten Preparation – Wandering Arc

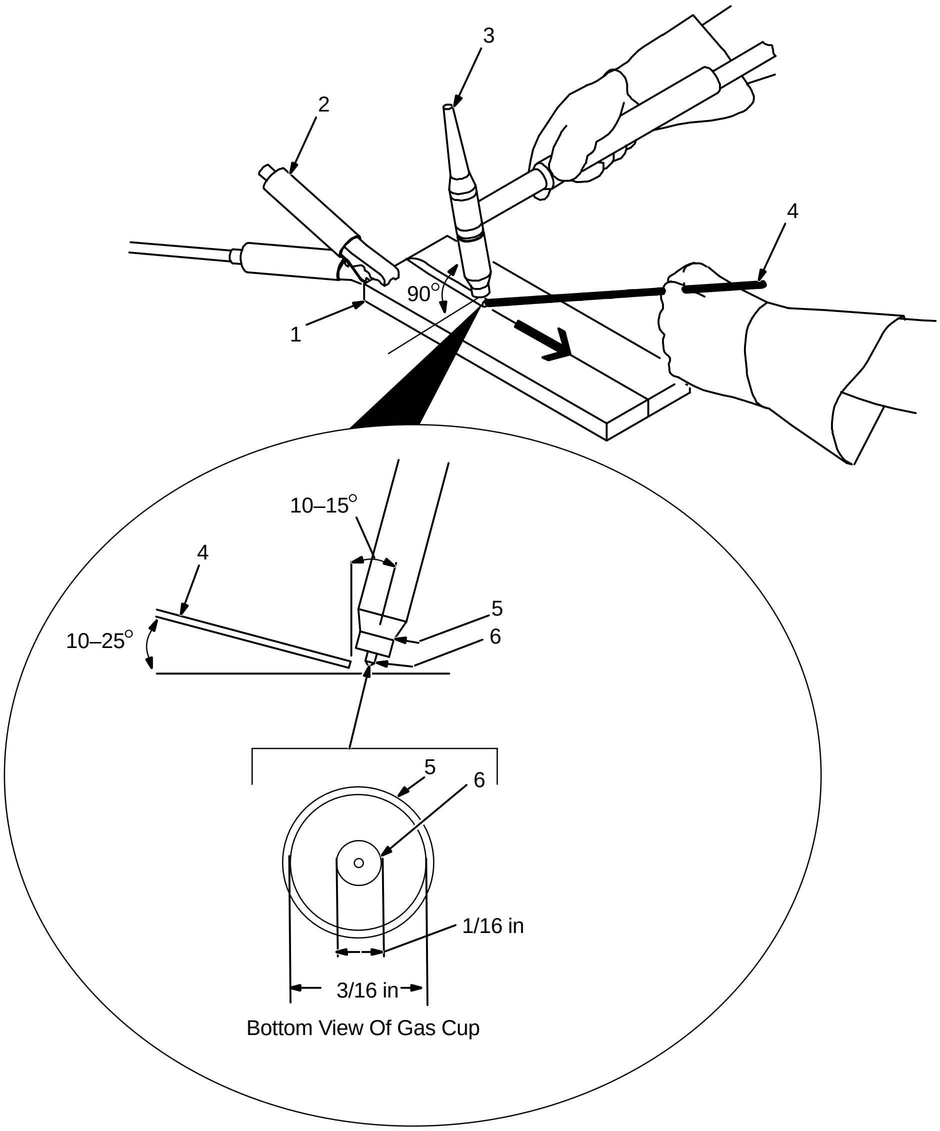
1 Arc Wander
2 Point
3 Grinding Wheel
4 Radial Ground

Ref. S-0161 / Ref. S-0162

SECTION 8 – GUIDELINES FOR TIG WELDING (GTAW)

8-1. Positioning The Torch





▲ **Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using cerium or lanthanum based tungsten instead of thoriated. Thorium dust contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.**

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Torch

4 Filler Rod (If Applicable)

5 Gas Cup

6 Tungsten Electrode

Select and prepare tungsten according to Sections 7-1, and 7-2 or 7-3.

Guidelines:

The inside diameter of the gas cup should be at least three times the tungsten diameter to provide adequate shielding gas coverage. (For example, if tungsten is 1/16 in diameter, gas cup should be a minimum of 3/16 in diameter.

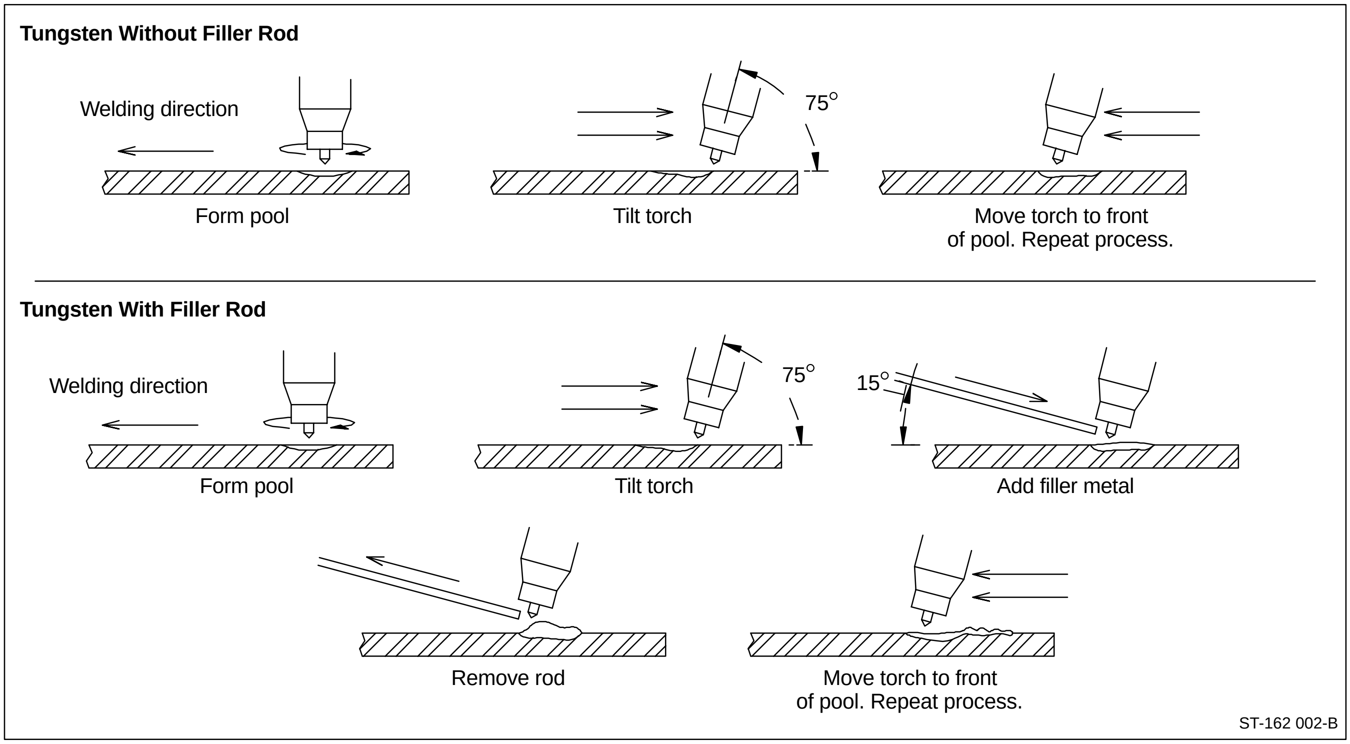
Tungsten extension is the distance the tungsten extends out gas cup of torch.

The tungsten extension should be no greater than the inside diameter of the gas cup.

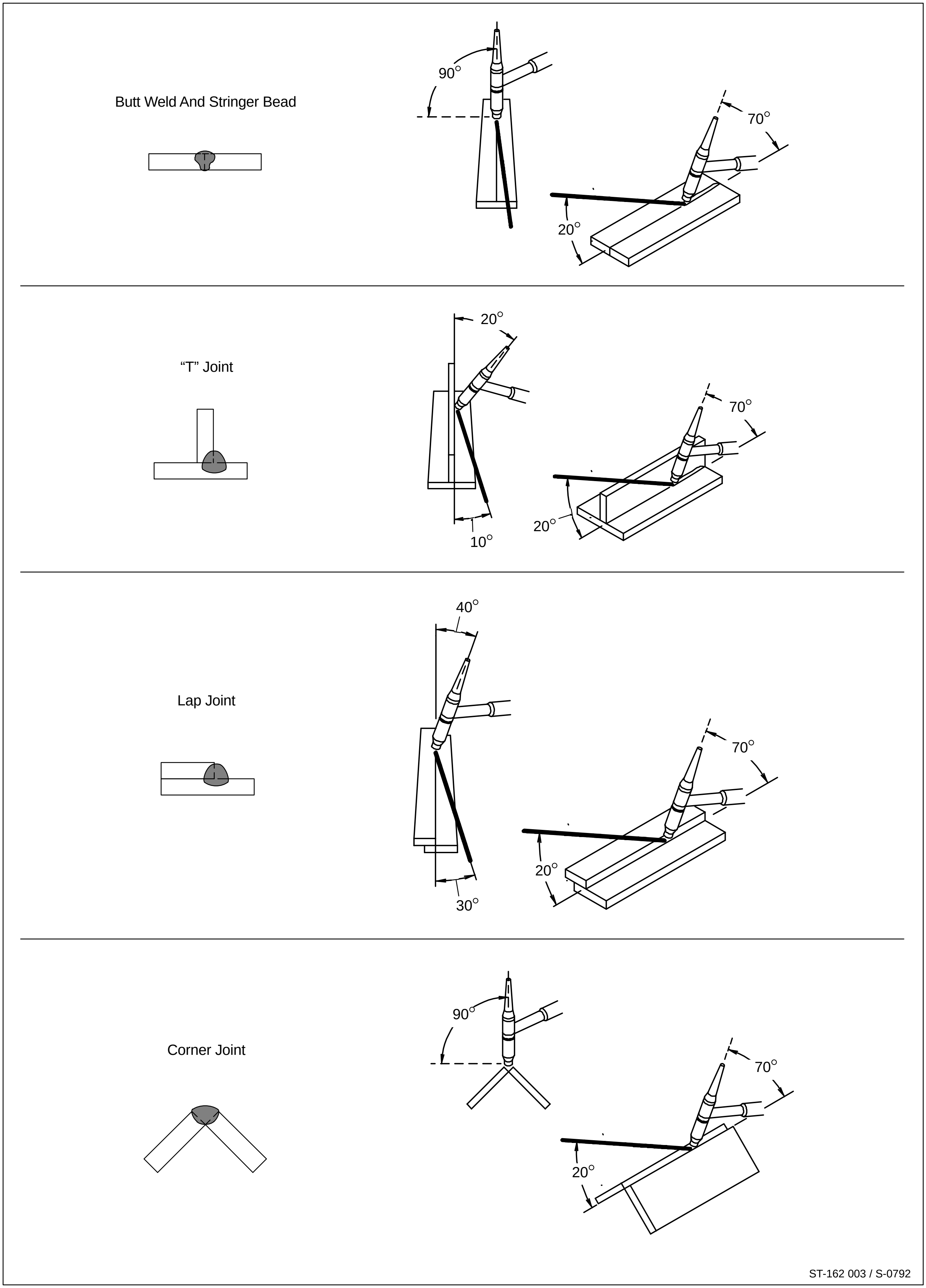
Arc length is the distance from the tungsten to the workpiece.

Ref. ST-161 892

8-2. Torch Movement During Welding

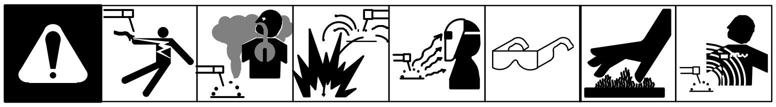


8-3. Positioning Torch Tungsten For Various Weld Joints

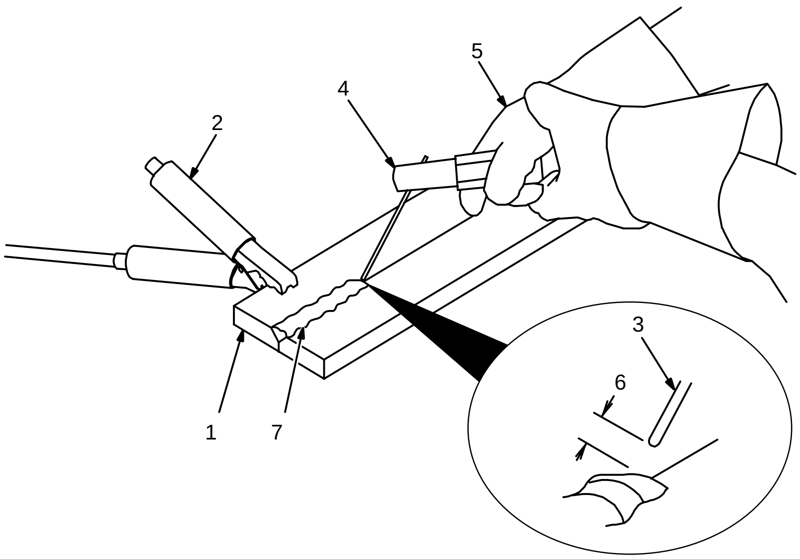


Notes

SECTION 9 – STICK WELDING (SMAW) GUIDELINES



9-1. Stick Welding Procedure



▲ **Weld current starts when electrode touches workpiece.**

▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

3 Electrode

A small diameter electrode requires less current than a large one. Follow electrode manufacturer's instructions when setting weld amperage (see Section 9-2).

4 Insulated Electrode Holder

5 Electrode Holder Position

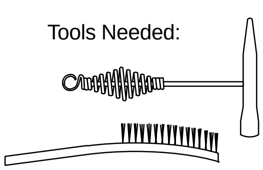
6 Arc Length

Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound.

7 Slag

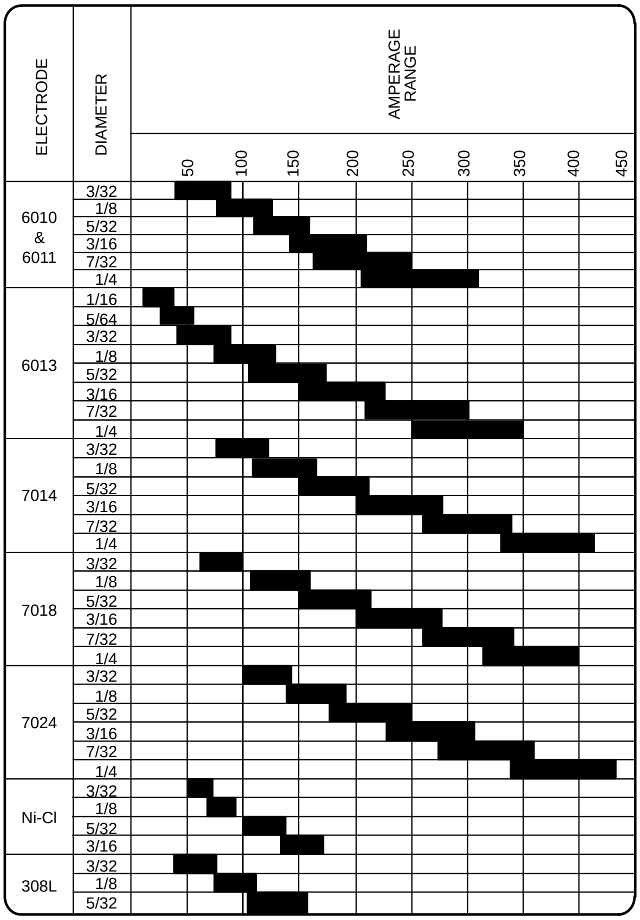
Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

Tools Needed:



stick 12/96 – ST-151 593

9-2. Electrode and Amperage Selection Chart

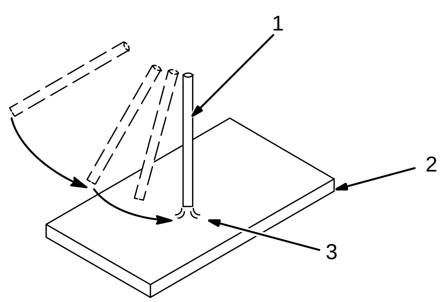


ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6011	EP	√	ALL	DEEP	
6013	EP,EN	√	ALL	LOW	GENERAL
7014	EP,EN	√	ALL	MED	SMOOTH, EASY, FAST
7018	EP	√	ALL	LOW	LOW HYDROGEN, STRONG
7024	EP,EN	√	FLAT HORIZ FILLET	LOW	SMOOTH, EASY, FASTER
NI-CL	EP	√	ALL	LOW	CAST IRON
308L	EP	√	ALL	LOW	STAINLESS

*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

Ref. S-087 985-A

9-3. Striking an Arc – Scratch Start Technique

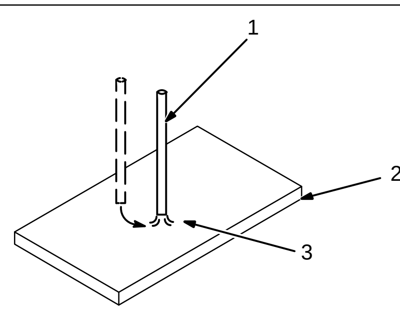


1 Electrode
2 Workpiece
3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted to high. If electrode sticks to workpiece, use a quick twist to free it.

S-0049

9-4. Striking an Arc – Tapping Technique

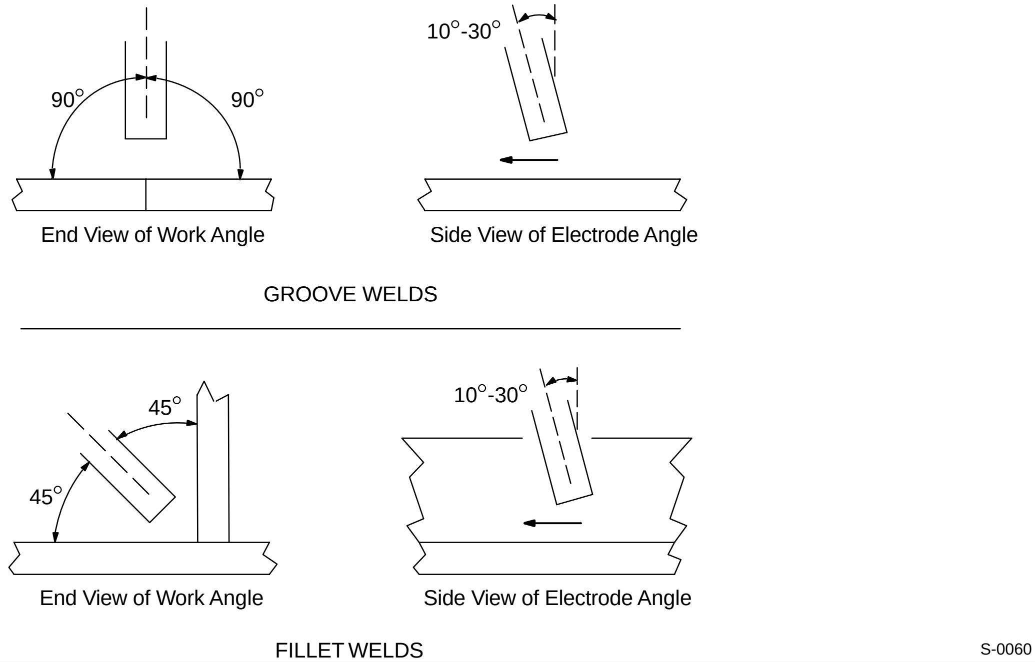


1 Electrode
2 Workpiece
3 Arc

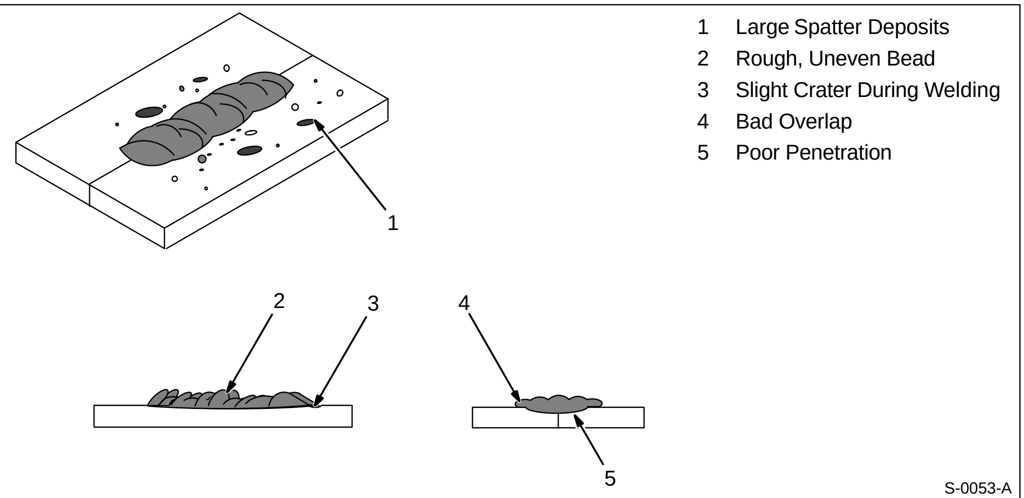
Bring electrode straight down to workpiece; then lift slightly to start arc. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

S-0050

9-5. Positioning Electrode Holder

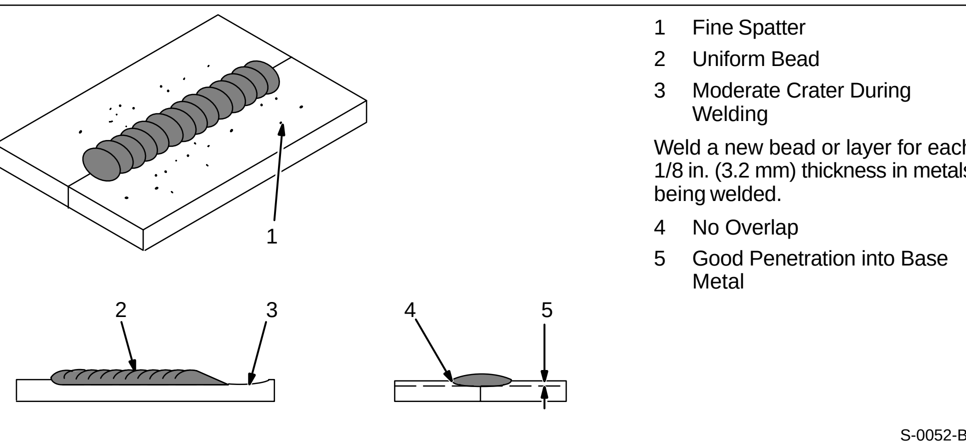


9-6. Poor Weld Bead Characteristics



1 Large Spatter Deposits
2 Rough, Uneven Bead
3 Slight Crater During Welding
4 Bad Overlap
5 Poor Penetration

9-7. Good Weld Bead Characteristics



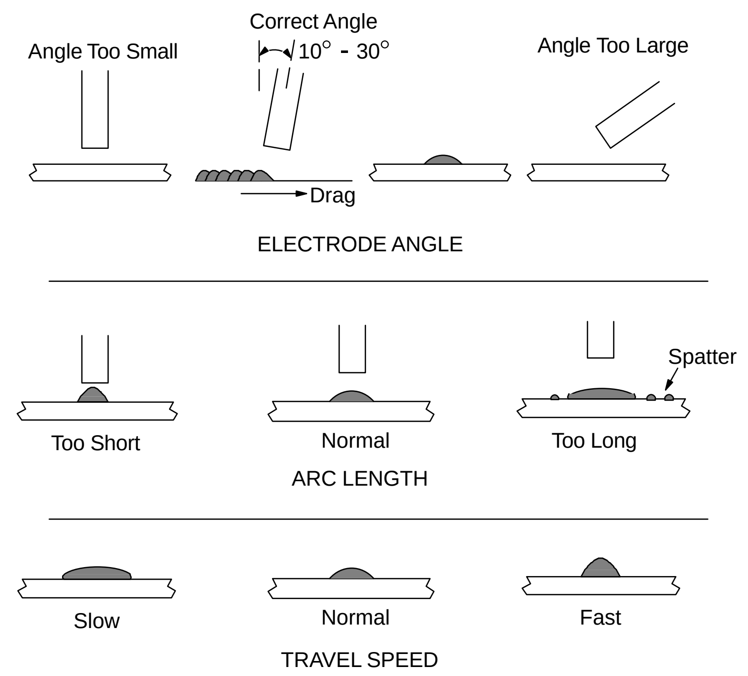
1 Fine Spatter
2 Uniform Bead
3 Moderate Crater During Welding

Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

4 No Overlap
5 Good Penetration into Base Metal

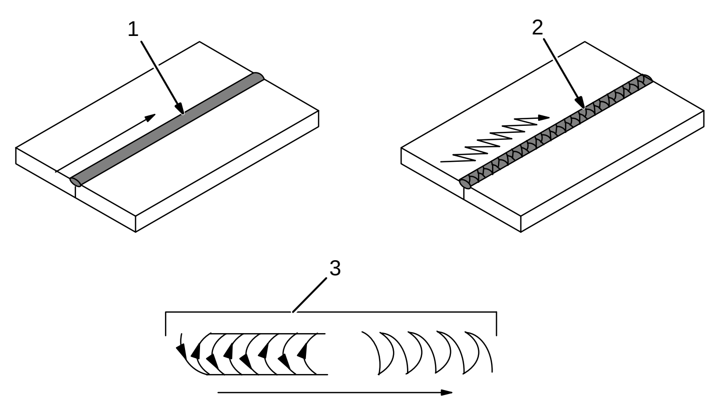
9-8. Conditions That Affect Weld Bead Shape

NOTE ☞ *Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.*



9-9. Electrode Movement During Welding

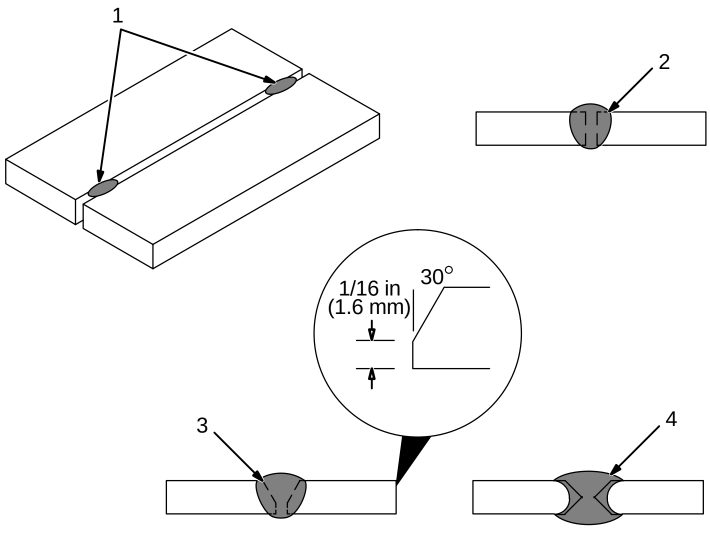
NOTE ☞ *Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads work better.*



1 Stringer Bead – Steady Movement Along Seam
2 Weave Bead – Side to Side Movement Along Seam
3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode. Do not let weave width exceed 2-1/2 times diameter of electrode.

9-10. Butt Joints



1 Tack Welds

Prevent edges of joint from drawing together ahead of electrode by tack welding the materials in position before final weld.

2 Square Groove Weld

Good for materials up to 3/16 in (5 mm) thick.

3 Single V-Groove Weld

Good for materials 3/16 – 3/4 in (5-19 mm) thick. Cut bevel with oxy-acetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

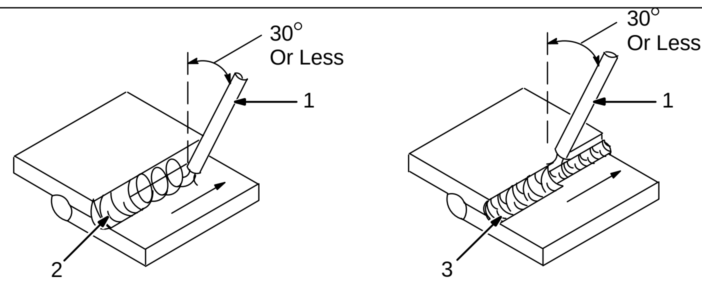
Create 30 degree angle of bevel on materials in V-groove welding.

4 Double V-Groove Weld

Good for materials thicker than 3/16 in (5 mm).

S-0662

9-11. Lap Joint



Single-Layer Fillet Weld

Multi-Layer Fillet Weld

1 Electrode

2 Single-Layer Fillet Weld

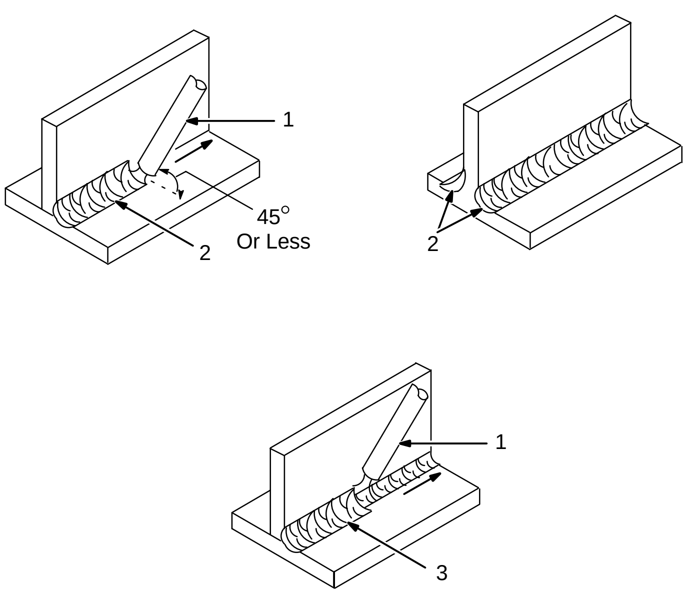
Move electrode in circular motion.

3 Multi-Layer Fillet Weld

Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

S-0063 / S-0064

9-12. Tee Joint



1 Electrode

2 Fillet Weld

Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

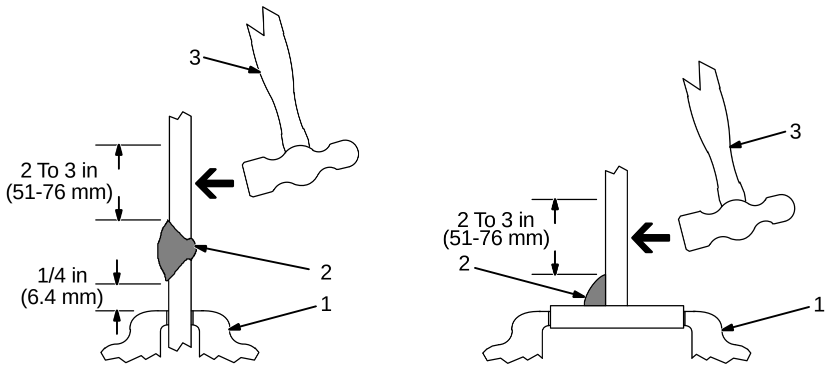
For maximum strength weld both sides of upright section.

3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section 9-9. Remove slag before making another weld pass.

S-0060 / S-0058-A / S-0061

9-13. Weld Test

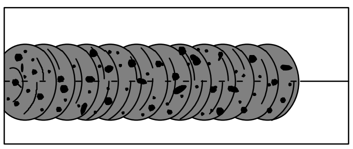


1 Vise
2 Weld Joint
3 Hammer

Strike weld joint in direction shown. A good weld bends over but does not break.

S-0057-B

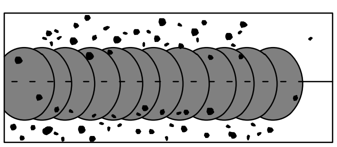
9-14. Troubleshooting – Porosity



Porosity – small cavities or holes resulting from gas pockets in weld metal.

Possible Causes	Corrective Actions
Arc length too long.	Reduce arc length.
Damp electrode.	Use dry electrode.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

9-15. Troubleshooting – Excessive Spatter



Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

Possible Causes	Corrective Actions
Amperage too high for electrode.	Decrease amperage or select larger electrode.
Arc length too long or voltage too high.	Reduce arc length or voltage.

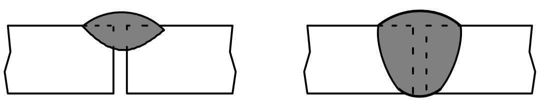
9-16. Troubleshooting – Incomplete Fusion



Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

Possible Causes	Corrective Actions
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.
	Adjust work angle or widen groove to access bottom during welding.
	Momentarily hold arc on groove side walls when using weaving technique.
	Keep arc on leading edge of weld puddle.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

9-17. Troubleshooting – Lack Of Penetration

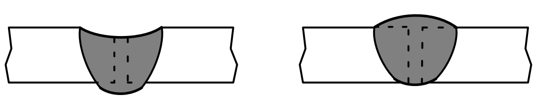


Lack of Penetration   Good Penetration

Lack Of Penetration – shallow fusion between weld metal and base metal.

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.
Improper weld technique.	Keep arc on leading edge of weld puddle.
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
	Reduce travel speed.

9-18. Troubleshooting – Excessive Penetration

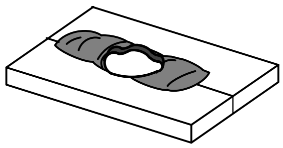


Excessive Penetration   Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

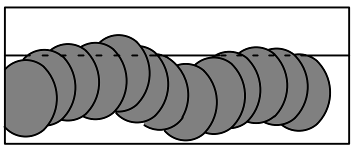
9-19. Troubleshooting – Burn-Through



Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

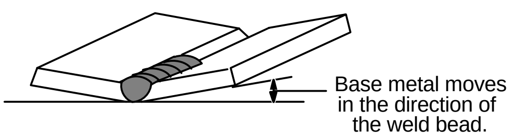
9-20. Troubleshooting – Waviness Of Bead



Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

Possible Causes	Corrective Actions
Unsteady hand.	Use two hands. Practice technique.

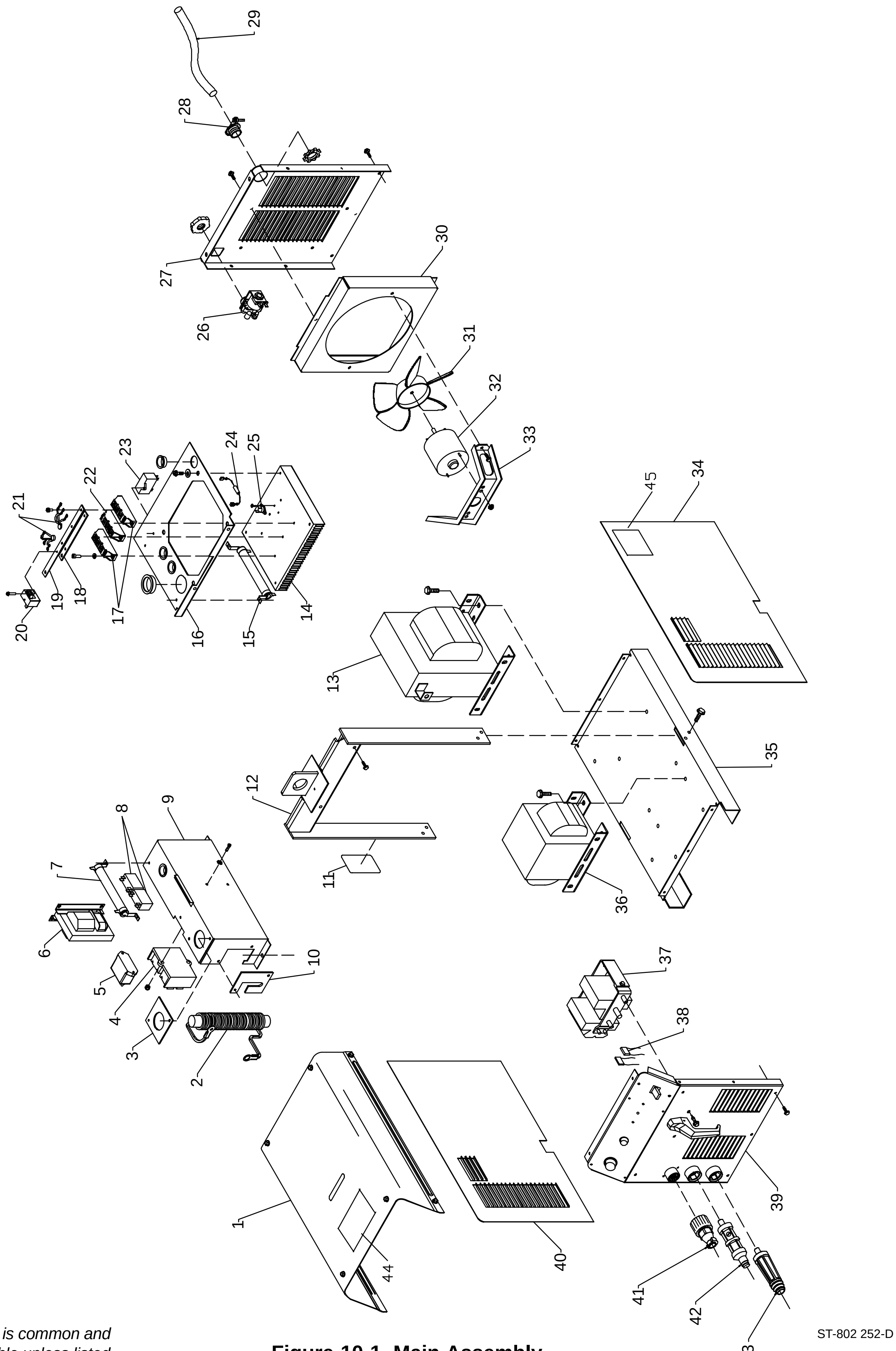
9-21. Troubleshooting – Distortion



Distortion – contraction of weld metal during welding that forces base metal to move.

Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower amperage for electrode.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

SECTION 10 – PARTS LIST



☞ *Hardware is common and not available unless listed.*

Figure 10-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 10-1. Main Assembly	
+ 1		188 270	COVER, top	1
.. 2	T4	190 332	COIL, coupling	1
.. 3		190 436	HOLDER, HF coil	1
.. 4	G1	199 854	SPARK GAP ASSEMBLY (consisting of)	1
		199 855	.... BASE	1
		199 856	.... HOLDER	4
		196 455	.... POINTS	4
.. 5	C3	201 197	CAPACITOR, polyp met film .002uf 4400 VAC	1
.. 6	T3	074 398	XFMR, high voltage 115 v pri 3600 v sec	1
.. 7	R8	188 067	RESISTOR, WW fxd 100w 200 ohm	1
.. 8	C18, 19	191 944	CAPACITOR, polyp met film 10uf	2
.. 9		188 369	HF BOX	1
.. 10		190 514	HOLDER, HF coil slide	1
+ 11		192 828	LABEL	1
.. 12		188 272	FRAME, lifting	1
.. 13	T1	188 283	XFMR, power main 208/230	1
	TP1, 2	020 520	THERMOSTAT, NC open 135C w/insulator	2
	PLG1	202 119	Connector W/Sockets	1
	PLG7	202 116	Connector W/Sockets	1
	PLG8	202 117	Connector W/Sockets	1
	PLG11	202 118	Connector W/Sockets	1
.. 14		190 341	HEAT SINK, rectifier	1
.. 15	R1	186 468	RESISTOR, WW fxd 100w 50 ohm	1
.. 16		188 367	BRACKET, rectifier	1
.. 17	MOD1, 2	192 105	THYRISITOR, SCR module 95A 400V 150C dual	2
.. 18		190 343	BUS BAR, rectifier	1
.. 19		190 342	BUS BAR, rectifier	1
.. 20	HD1	191 941	TRANSDUCER, current hall effect	1
.. 21	C7, 8, 9, 10	190 460	CAPACITOR ASSEMBLY	2
.. 22	D1	192 116	MODULE, diode	1
.. 23	C1	191 944	CAPACITOR, polyp met film 10uf	1
.. 24		189 132	RESISTOR ASSEMBLY	1
.. 25	TP3	194 363	THERMOSTAT, NC open 150F close 125F	1
.. 26		133 873	VALVE, 24VDC 2way	1
.. 27		188 268	PANEL, rear	1
.. 28		604 102	CONNECTOR, clamp cable .690/1.070	1
.. 29		190 442	CORD SET, 250V 8/3 10 ft	1
.. 30		188 366	PLENUM	1
.. 31		150 783	BLADE, fan 9 in 5wg 39deg .312 bore cw	1
.. 32		188 706	MOTOR, fan 230V 50/60Hz 1550 RPM	1
.. 33		187 807	BRACKET, fan motor mtg	1
+ 34		188 362	PANEL, side right	1
.. 35		188 269	BASE	1
.. 36	Z1	188 284	STABILIZER	1
.. 37	S5	187 467	SWITCH, polarity/changeover	1
.. 38	C13, 14	188 964	CAPACITOR ASSEMBLY	2
.. 39		Figure 10-2	PANEL, front w/components	1
.. 40		188 271	PANEL, side left	1
.. 41		141 162	HOUSING PLUG AND PINS (service kit)	0
.. 42		155 552	CONNECTOR, torch (service kit)	0
.. 43		134 460	CONNECTOR, work cable (service kit)	0
.. 44		134 327	LABEL, warning general precautionary	1
.. 45		185 759	LABEL, warning electric shock	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 10-1. Main Assembly (continued)				
		188 859	. . ACCESSORY KIT (consisting of)	1
		043 554	. . . . RFCS-14, foot control	1
		DB1712RDI	. . . . TORCH, TIG 150A 12.5 ft cable	1
		188 860	. . . . WORK CABLE, w/clamp	1
		193 094	. . . . KIT, regulator/hose	1
		176 840	. . . . HOLDER, electorde w/cable & dinse connector	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

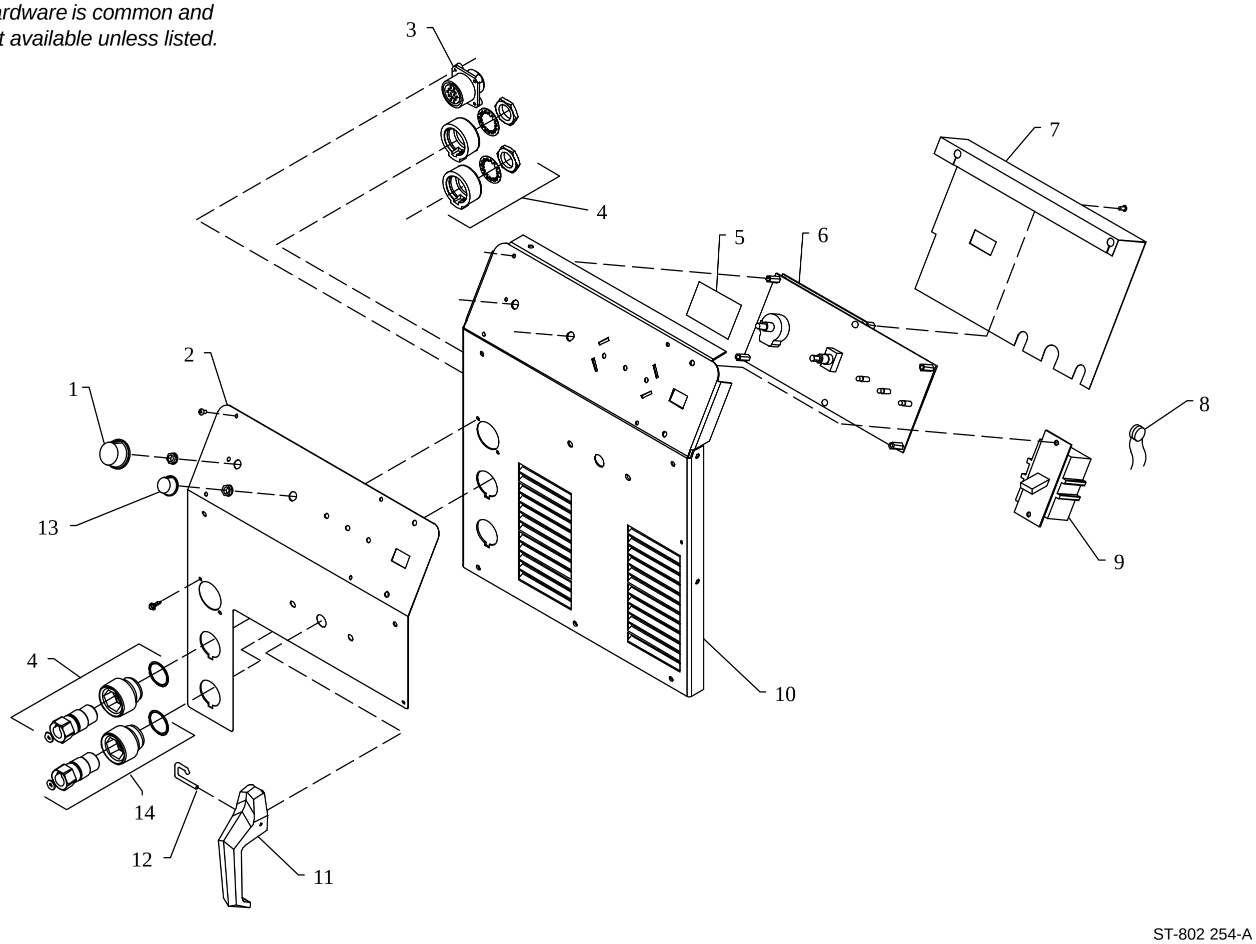


Figure 10-2. Panel, Front w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 10-2. Panel, Front w/Components (Figure 10-1 Item 39)	
1		174 991	KNOB, pointer	1
2			NAMEPLATE, (order by model and serial number)	1
3	RC7	143 976	RECEPTACLE W/ SOCKETS	1
4		186 092	RECPT KIT, Din style	1
5		192 451	COVER, LED diffuser	1
6	PC1	190 772	CIRCUIT CARD ASSEMBLY, control w/ hardware	1
	PLG3	115 092	CONNECTOR & SOCKETS	1
	PLG6	115 091	CONNECTOR & SOCKETS	1
	PLG20	115 093	CONNECTOR & SOCKETS	1
	PLG10	131 052	CONNECTOR & SOCKETS	1
7		192 279	ENCLOSURE, circuit card assembly	1
8		111 634	CAPACITOR ASSEMBLY	1
9	S1	128 755	SWITCH, tgl DPST 40A 600VAC	1
10	C5, 6	188 273	PANEL, front	1
11		175 952	PLASTIC, handle switch	1
12		169 136	PIN, handle	1
13		174 992	KNOB, pointer .840 DIA x .250 ID	1
14		185 703	RECEPTACLE, Twistlock assembly	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer’s Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

HOBART WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

This limited warranty supersedes all previous Hobart warranties and is exclusive with no other guarantees or warranties expressed or implied.

Warranty Questions?

Call
1-877-HOBART1
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Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor or call 1-800-332-3281. The expertise of the distributor and Hobart is there to help you, every step of the way.

LIMITED WARRANTY – Subject to the terms and conditions below, Hobart Welding Products., Troy, Ohio, warrants to its original retail purchaser that new Hobart equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Hobart. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Hobart will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Hobart must be notified in writing within thirty (30) days of such defect or failure, at which time Hobart will provide instructions on the warranty claim procedures to be followed.

Hobart shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Hobart Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

HOBART's Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Hobart, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Hobart, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

HOBART PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Hobart's option: (1) repair; or (2) replacement; or, where authorized in writing by Hobart in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Hobart service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Hobart's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Hobart authorized service facility as determined by Hobart. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL HOBART BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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HOBART® WELDERS

Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
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Resources Available

Always provide Model Name and Serial/Style Number.

To locate a Distributor, retail or service location:

Call 1-877-Hobart1 or visit our website at www.HobartWelders.com

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File a claim for loss or damage during shipment.

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